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AP[®] Microeconomics Full Review

VERSION 2.0

AUTHOR: GABE REN

Primary Works Consulted:

1. Notes from Mrs. Joelle Keats', Mr. Nathan Tengowski, and Mr. Jason Mohr's AP Economics Classes
2. Cracking the AP Economics Exams (2015)
3. ACDCecon: <http://www.acdcecon.com/#!ap-econ/c18qp>
4. Crash Course Economics: <https://www.youtube.com/user/crashcourse>

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Table of Contents

Please Read/Background Info.....	5
About the Exams.....	5
Resources.....	6
Tips.....	6
Key for Abbreviations.....	7
Micro Unit 1: Basic Economic Concepts.....	8
Scarcity.....	8
Factors of Production (Inputs): LLCE.....	8
EXAMPLE: Factors of Production – Donut Shop.....	8
Opportunity Costs.....	9
GRAPH: Production Possibilities Curve/Frontier (PPC/PPF) with Specialization.....	9
GRAPH: Production Possibilities Curve/Frontier (PPC/PPF) without Specialization.....	10
GRAPH: Capital Goods vs. Consumption Goods on a PPC/PPF.....	11
Specialization and Comparative Advantage.....	12
EXAMPLE: Absolute and Comparative Advantages.....	12
Three Important Questions for any Economy.....	13
Systems of Government.....	14
Micro Unit 2: The Nature and Functions of Product Markets: Supply and Demand.....	15
GRAPH: Demand Curve.....	15
EXAMPLE: Summation of Individual Demand Curves.....	16
GRAPH: Marginal Utility (MU) vs. Total Utility.....	17
GRAPH: Supply Curve.....	18
EXAMPLE: Summation of Individual Supply Curves.....	19
GRAPH: Supply and Demand.....	19

EXAMPLE: Supply or Demand Shifting	20
EXAMPLE: Supply and Demand Shifting.....	21
GRAPH: Consumer and Producer Surplus.....	21
GRAPH: Price Ceilings	22
GRAPH: Price Floors	22
EXAMPLE: Tax on Buyers (Demand).....	23
EXAMPLE: Tax on Suppliers (Supply)	24
Micro Unit 3: Production, Costs, and Elasticity	25
Elasticity	25
Price Elasticity of Demand	25
GRAPH: Price Elasticity of Demand	26
EXAMPLE: Total Revenue Test.....	27
Price Elasticity of Supply	27
Income Elasticity of Demand	28
Cross-Price Elasticity of Demand.....	28
GRAPH: Marginal Product and Total Product.....	29
GRAPH: Marginal Cost and Total Cost	30
Short Run vs. Long Run	31
GRAPH: Economies of Scale.....	32
Micro Unit 4: Perfect Competition.....	33
Key Terms	33
EXAMPLE: Decreasing Cost Industry (less common).....	34
GRAPH: Perfect Competition	35
GRAPH: Total Cost and Total Revenue.....	36
GRAPH: Perfect Competition – Profit Maximizing Firm.....	37

GRAPH: Shut Down Decision	38
Micro Unit 5: Monopolies	39
GRAPH: Monopoly	39
Price Discrimination	40
GRAPH: Monopoly – Perfect Price Discrimination	40
GRAPH: Monopoly – Perfect Price Discrimination w/Differing Demand Elasticities	41
EXAMPLE: Government Policy towards Imperfect Competition	41
GRAPH: Natural Monopoly	42
Micro Unit 6: Monopolistic Competition and Oligopolies.....	43
GRAPH: Monopolistic Competition	43
Oligopoly	44
Game Theory	44
EXAMPLE: Payoff Matrix – Dominant Strategy Equilibrium	45
EXAMPLE: Payoff Matrix – Non-Dominant Strategy Equilibrium	46
Bilateral Monopoly (less common)	46
SUMMARY: Market Structures	47
Micro Unit 7: Factor Markets	48
EXAMPLE: Factor Markets – Ice Cream Machines	48
GRAPH: Marginal Revenue Product of Labor.....	48
GRAPH: Perfectly Competition – Labor Market	49
GRAPH: Monopsony.....	50
Unions (less common)	51
Micro Unit 8: Market Failures and the Role of Government	52
Market Failures	52
Externalities	52

EXAMPLE: Negative Externality	53
EXAMPLE: Positive Externality.....	53
Public Goods.....	54
Antitrust Legislation (less common)	54
Measures of Market Power (less common)	55
GRAPH: Lorenz Curve.....	55
Poverty and Taxes.....	56

Please Read/Background Info

- I. This resource is not meant to teach you economics; rather it is meant to serve as a concise guide for you to review economic knowledge you have already learned (translation: you still need to pay attention in class)
- II. Very few parts of this study guide are bolded so **pay special attention to bolded sections**
- III. (less common) indicates material that can, but rarely, appears on the AP test
- IV. GRAPH: or DIAGRAM: indicates the section has an accompanying graph or diagram
- V. SUMMARY: provides a short summary of a section's material
- VI. This is the full version of the study guide. Other resources including the condensed version can be found here: <http://bit.ly/1UqPiBi>

About the Exams

Around 18% and 15% of people get 5s on the AP Micro and AP Macro tests, respectively¹

Shoot for an 80% to 85% on both the MC and FR sections for a 5

- I. 60 multiple choice
 - a. 70 minutes
 - b. 66% of total score
- II. 3 free response
 - a. 60 minutes
 - i. 10 minute reading/planning period
 1. **May begin the test during this time**
 - ii. 50 minute solving period
 - b. 33% of total score
 - i. Long FR counts for ½ of this percentage
 1. Spend around 25 minutes
 - ii. Two short FR count for ¼ of this percentage
 1. Spend around 25 minutes

¹ Data from the 2015 AP Microeconomics and AP Macroeconomics Tests

Resources

- I. AP Central
 - a. Contains course description with practice MC questions and past FR questions
 - b. Micro Homepage:
http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2121.html
 - c. Micro FR:
http://apcentral.collegeboard.com/apc/members/exam/exam_information/2084.html
 - d. Macro Homepage:
http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2120.html
 - e. Macro FR:
http://apcentral.collegeboard.com/apc/members/exam/exam_information/2083.html
- II. ACDCecon (Mr. Clifford)
 - a. <http://www.acdcecon.com/#!ap-econ/c18qp>
 - b. Micro cumulative video review: <https://www.youtube.com/watch?v=JRIREpsr348>
 - c. Macro cumulative video review: <https://www.youtube.com/watch?v=e18RXFFoL9c>
- III. Crash Course Economics
 - a. <https://www.youtube.com/user/crashcourse>

Tips

These are applicable to both exams, unless stated otherwise.

- I. Multiple choice section
 - a. Types of questions
 - i. Economic policy
 - ii. Graphs
 - iii. True vs. false statements
 - b. Use the process of elimination
 - c. Stick with your gut feeling
 - d. Two pass system
 - i. Skip the questions you aren't comfortable with

1. Come back to them later if you have time
 - ii. Use the letter of the day strategy
 1. Guess using the same answer choice
 - e. **No penalty for guessing**
- II. Free response section
 - a. Determine which economic tools the question is asking about
 - b. **Always draw graphs even if they aren't explicitly asked for**
 - i. Label every line and axis
 - ii. Graphs will help you avoid making silly mistakes
 - c. Don't skip steps in your explanation
 - i. Bad answer: expansionary monetary policy shifts AD out
 - ii. Good answer: expansionary monetary policy shifts the money supply curve to the right, thus lowering interest rates which attracts more investment and shifts AD out
 - d. Don't say unnecessary stuff though
 - i. AP graders will take off points for incorrect extraneous information
 - e. As a blanket statement, **always think in terms of marginal cost = marginal benefit**

Key for Abbreviations

- I. **MC** = multiple choice
- II. **FR** = free response
- III. **PL** = price level
- IV. **F.O.P.** = factors of production
- V. **Rightward shift = outward shift**
- VI. **Leftward shift = inward shift**
- VII. **SR** = short run
- VIII. **LR** = long run
- IX. e = subscript e = equilibrium
- X. Δ = delta = change in
- XI. **Fed** = federal reserve = central bank
- XII. **Ceteris paribus** = all other things being held equal

Micro Unit 1: Basic Economic Concepts

Economics is the study of **how to allocate scarce resources among** competing ends.

Microeconomics analyzes the market behavior of individual consumers and firms in an attempt to understand the decision-making process of firms and households.

Scarcity

- I. Occurs b/c our unlimited desire for goods and services exceeds our limited ability to produce them due to constraints on time and resources

Factors of Production (Inputs): LLCE

- I. Land (natural resources)
 - a. Any productive resource existing in nature
 - b. E.g. water, wind, mineral deposits
- II. Labor
 - a. Physical and mental effort of people
- III. Capital
 - a. Manufactured goods that can be used in the production process
 - b. E.g. tools, equipment, buildings, machinery
 - c. Human capital (less common)
 - i. Knowledge and skills acquired through training and experience
- IV. Entrepreneurship
 - a. Ability to identify opportunities and organize production
 - b. Willingness to accept risk in the pursuit of rewards

EXAMPLE: Factors of Production – Donut Shop

- I. Land
 - a. Land and rain provide wheat for the dough
- II. Labor
 - a. People making and selling the donuts

III. Capital

- a. Building, ovens

IV. Entrepreneurship

- a. Shop-owner took risks to open a business

Opportunity Costs

I. Value of the **best alternative sacrificed** as compared to what actually takes place

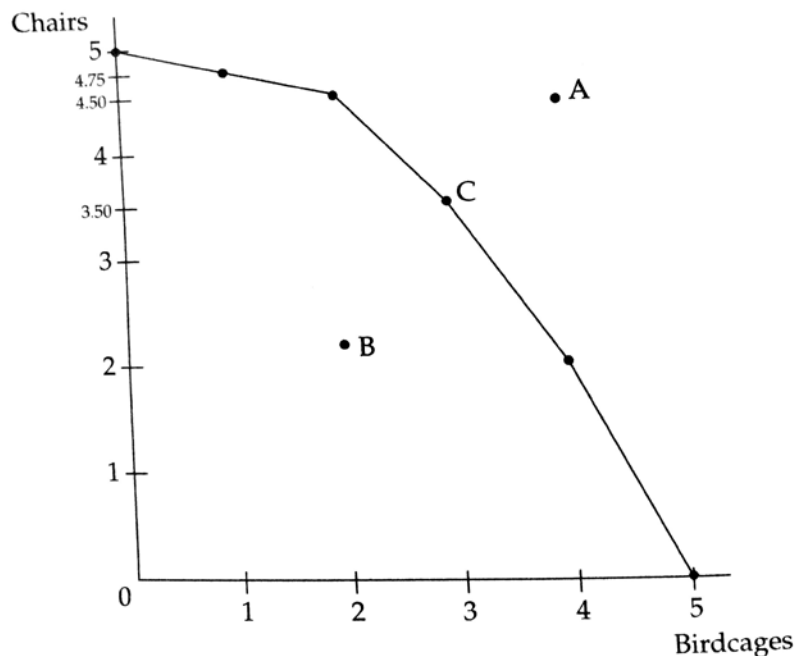
II. Implicit costs

- a. Forgone benefits of any single transaction
- b. E.g. time and effort an owner puts into maintaining a company, rather than expanding it

III. Explicit costs

- a. Expenses that are paid with cash or equivalent
- b. E.g. wages to workers, electricity bill

GRAPH: Production Possibilities Curve/Frontier (PPC/PPF) with Specialization



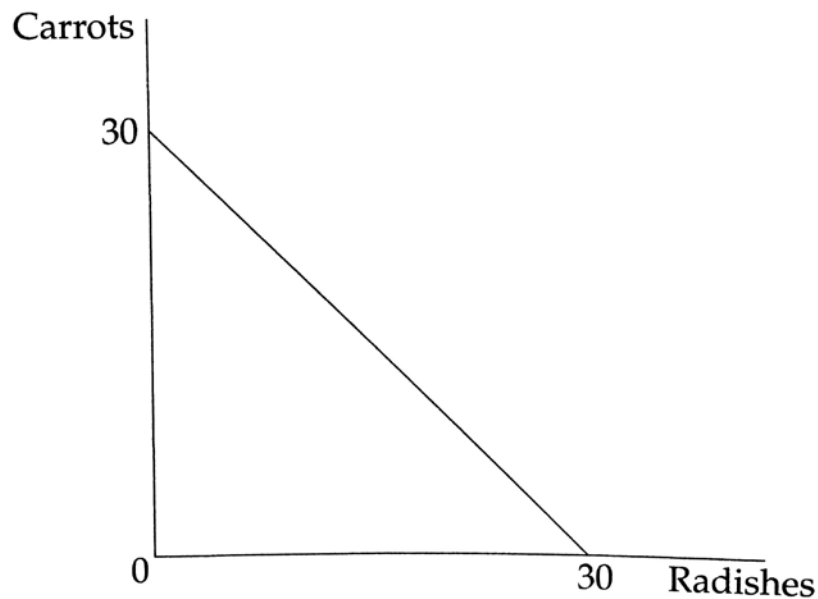
I. Illustrates the choices an economy faces when deciding to produce one good over another

II. Point A

- a. Outside the frontier
- b. Currently unobtainable

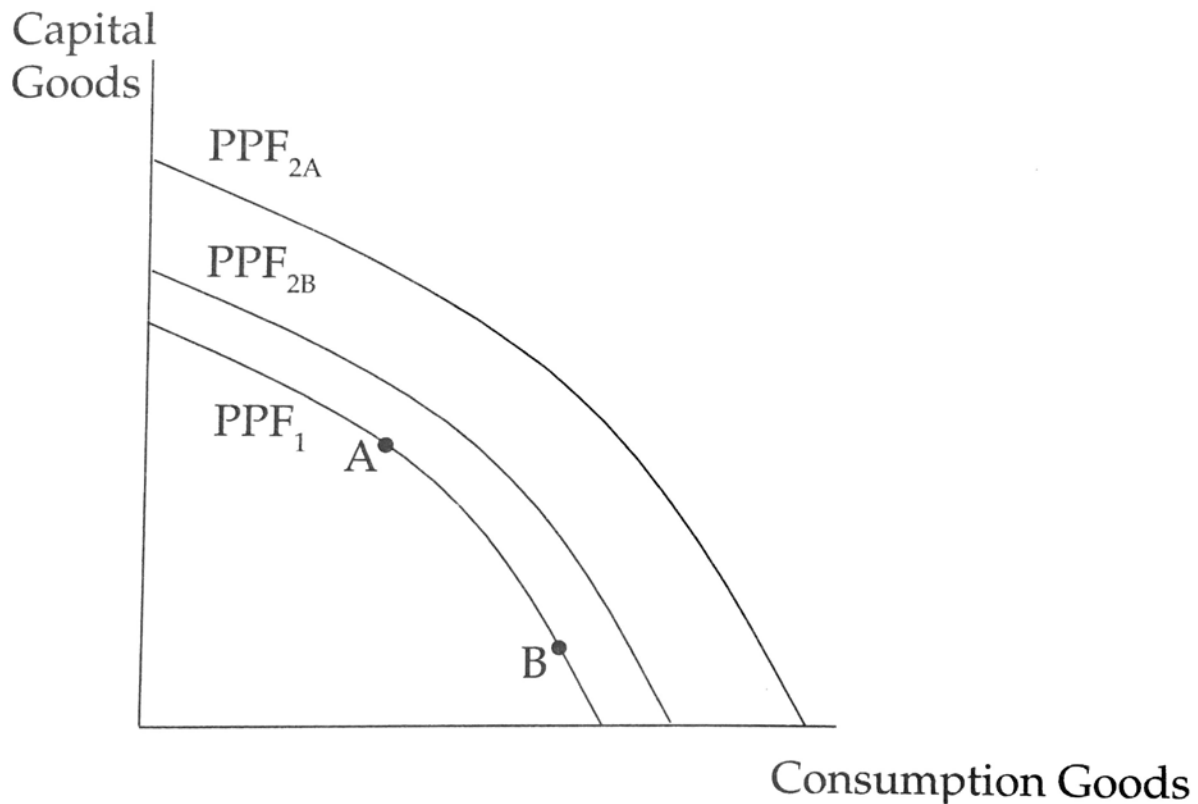
- III. Point B
 - a. Inside the frontier
 - b. Obtainable but inefficient
- IV. Point C
 - a. On the frontier
 - b. **Efficiency occurs at all points on the frontier**
 - i. Economy is using all of its resources productively
- V. Effects of specialization on the PPC/PPF (less common)
 - a. Assume our economy is only producing chairs
 - b. The initial opportunity cost of producing one birdcage is small, only 0.25 chairs
 - c. However, as we begin to produce more birdcages, the opportunity cost rises
 - d. This is b/c the resources that are used to produce birdcages are less and less specialized for birdcage production and more and more specialized for chair production

GRAPH: Production Possibilities Curve/Frontier (PPC/PPF) without Specialization



- I. Effect of no specialization on the PPC/PPF (less common)
 - a. Economy must allocate its resources between two goods that involves no specialization of resources; skills, tools etc. to produce the two goods may be identical

GRAPH: Capital Goods vs. Consumption Goods on a PPC/PPF

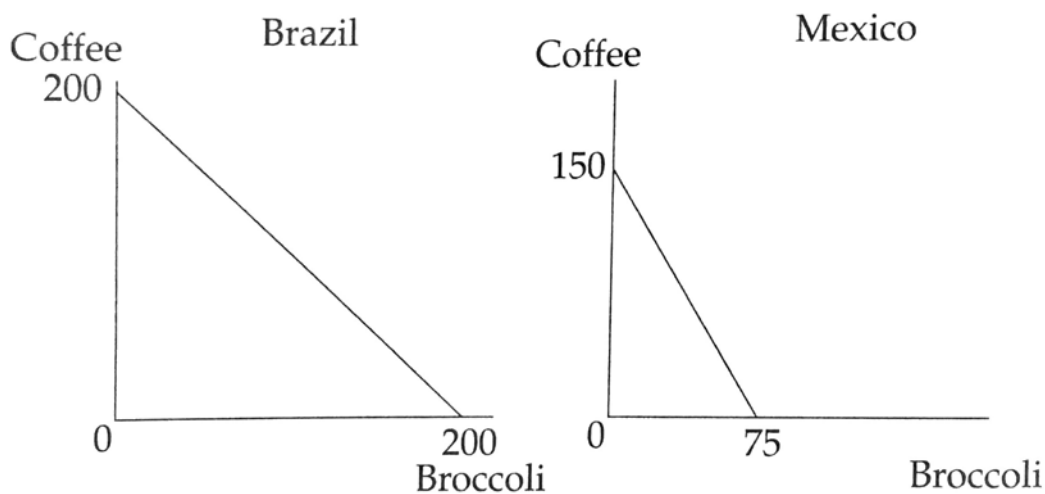


- I. Capital goods
 - a. Think investment
 - b. E.g. machines
- II. Consumption goods
 - a. Think consumer spending
 - b. E.g. food, clothing
- III. Point A
 - a. Relatively large investment in capital
 - b. Will lead to PPF_{2A}
 - i. More growth
- IV. Point B
 - a. Relatively large investment in consumption
 - b. Will lead to PPF_{2B}
 - i. Less growth

Specialization and Comparative Advantage

- I. Specialization results from people having different skills and leads to increased productivity
- II. Division of labor
 - a. Permits people to develop expertise in the task(s) they concentrate on
- III. Absolute advantage
 - a. Production of a good requires fewer resources per unit than another country
 - b. **Just b/c a country has an absolute advantage, it doesn't mean that the country necessarily benefits the most from producing that good**
- IV. Comparative advantage
 - a. Production of a good has a lower opportunity cost (of another good) than another country
 - b. **Countries will benefit from specialization if one country has a comparative advantage in one good, and the other country has a comparative advantage in the other good**
- V. Trade ends up benefiting **both** countries

EXAMPLE: Absolute and Comparative Advantages



- I. Consider Brazil and Mexico in the production of coffee and broccoli
- II. Brazil has an absolute advantage in both producing coffee and broccoli
- III. Let's calculate the comparative advantages for each country
 - a. $Brazil_{\text{opportunity cost for 1 coffee}} = 1 \text{ broccoli}$
 - b. $Brazil_{\text{opportunity cost for 1 broccoli}} = 1 \text{ coffee}$
 - c. $Mexico_{\text{opportunity cost for 1 coffee}} = 0.5 \text{ broccolis}$
 - d. $Mexico_{\text{opportunity cost for 1 broccoli}} = 2 \text{ coffees}$

- IV. Mexico has a comparative advantage in the production of coffee
- V. Brazil has a comparative advantage in the production of broccoli
- VI. Thus, both of these countries can **benefit** from trade

Three Important Questions for any Economy

- I. What goods and services will be produced?
 - a. Seeking allocative efficiency
 - i. $P = MC$
 - b. Output reflects the needs and wants of consumers
- II. How much of each input will be used in the production of each good?
 - a. Seeking productive efficiency
 - i. $P = \text{minimum ATC}$
 - b. Marginal products of labor and capital (less common)
 - i. Firm only uses labor and capital to produce goods
 - ii. *Price of labor* (P_L) = *wage* (w)
 - iii. *Price of capital* (P_K) = *rental rate* (r)
 - iv. $M = \text{marginal}$
 - v. We want $\frac{MP_K}{r} = \frac{MP_L}{w}$
 - 1. If one side is too “heavy,” a firm will invest more into the other side and decreases investment into the current side to achieve productive efficiency
- III. Who will receive the final products?
 - a. Seeking distributive efficiency (less common)
 - i. Marginal rate of substitution (MRS) = $\frac{P_A}{P_B} = \frac{MU_A}{MU_B}$
 - ii. Formal condition for distributive efficiency is when every consumer’s MRS is equal
 - b. Those who place the highest relative value on goods receive them
 - c. Marginal utilities
 - i. *Marginal utility* = MU
 - ii. We want $\frac{MU_{food}}{P_{food}} = \frac{MU_{clothes}}{P_{clothes}}$
 - 1. This is where utility is maximized

Systems of Government

I. Communism

- a. Minimize imbalance in wealth via the collective ownership of property
- b. Lacks incentives for extra effort, risk taking, and innovation
- c. Wages determined by the gov.
- d. Particularly vulnerable to corruption as the gov. plays the central role in allocating resources; only one political party

II. Socialism

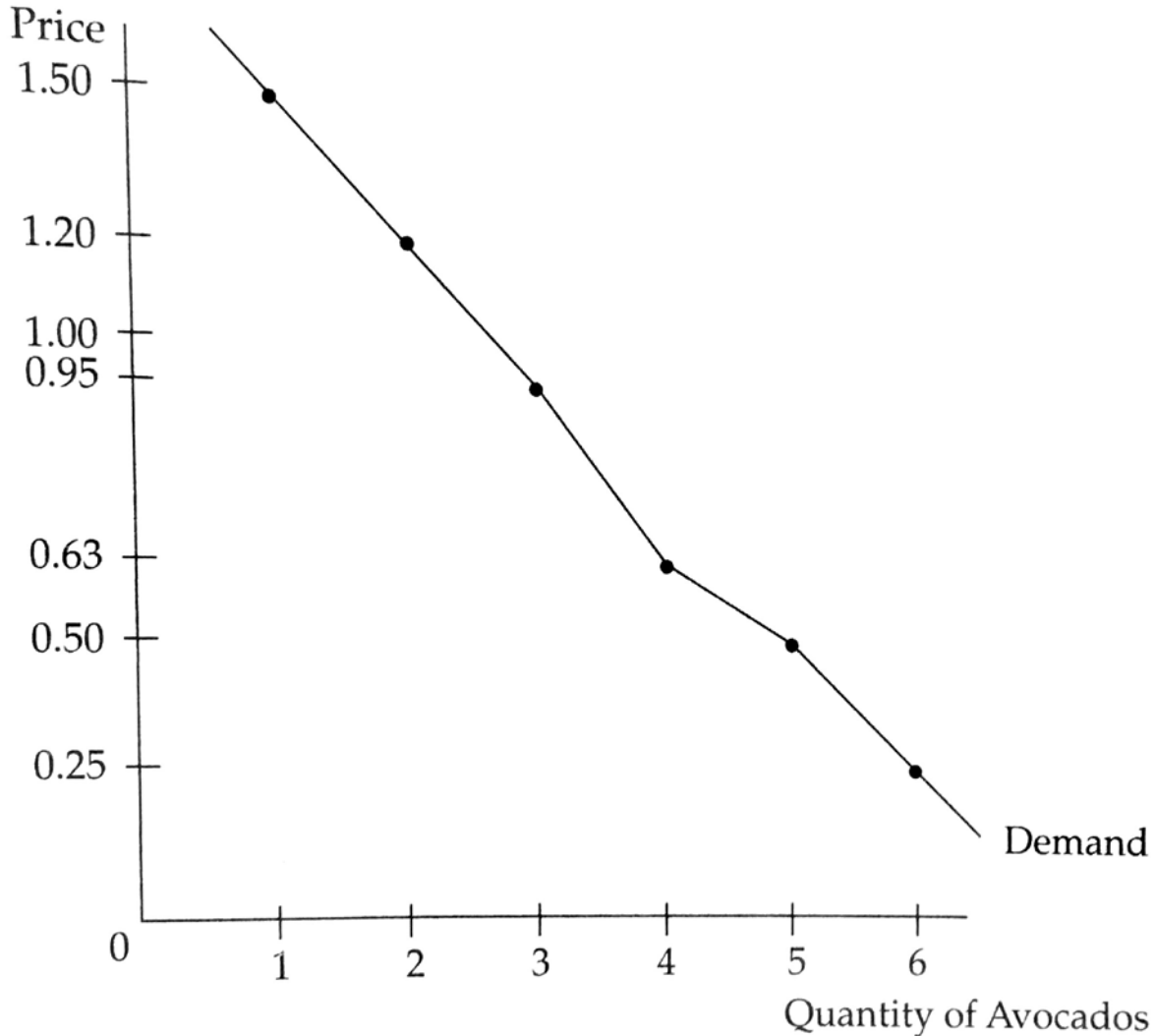
- a. Minimize imbalance in wealth
- b. Lacks incentives for extra effort, risk taking, and innovation
- c. Wages determined by negotiations between trade unions and managers
- d. Multiple political parties

III. Capitalism

- a. Pursuit of individual profit
- b. Private individuals control the factors of production
- c. Wages determined by negotiations between trade unions and managers
- d. Market forces of supply and demand determine the allocation of resources
- e. Gov. can regulate business and provide tax-supported social benefits

Micro Unit 2: The Nature and Functions of Product Markets: Supply and Demand

GRAPH: Demand Curve



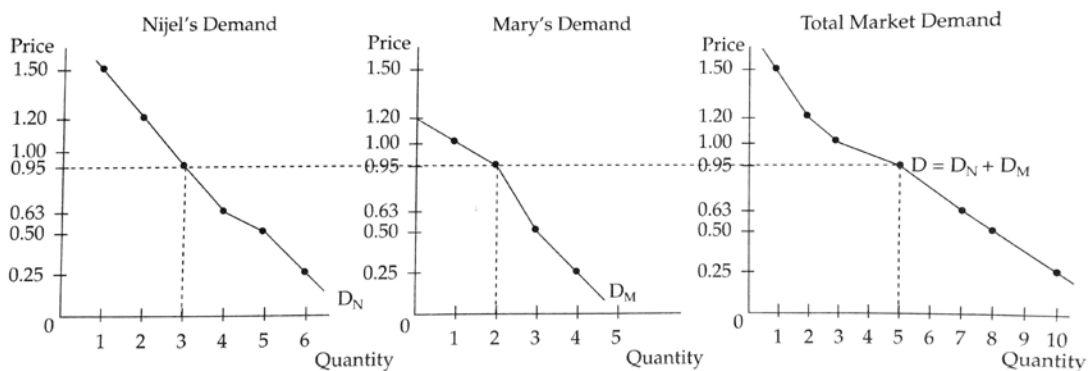
- I. Displays the relationship between price and the quantity demanded (Q_D) of a good
- II. Law of diminishing marginal utility
 - a. Consuming additional units of a good will lead to decreasing satisfaction from that good
- III. Law of demand
 - a. As the price of a good rises, the quantity of that good demanded falls and vice versa
- IV. Individual demand curve
 - a. Reflects an individual's marginal utility received from each addition unit of the good
- V. Market demand curve
 - a. **Horizontal** summation of the individual demand curves in the market

VI. **Changes in the price of a good only affect the Q_D for that good, not the curve itself**

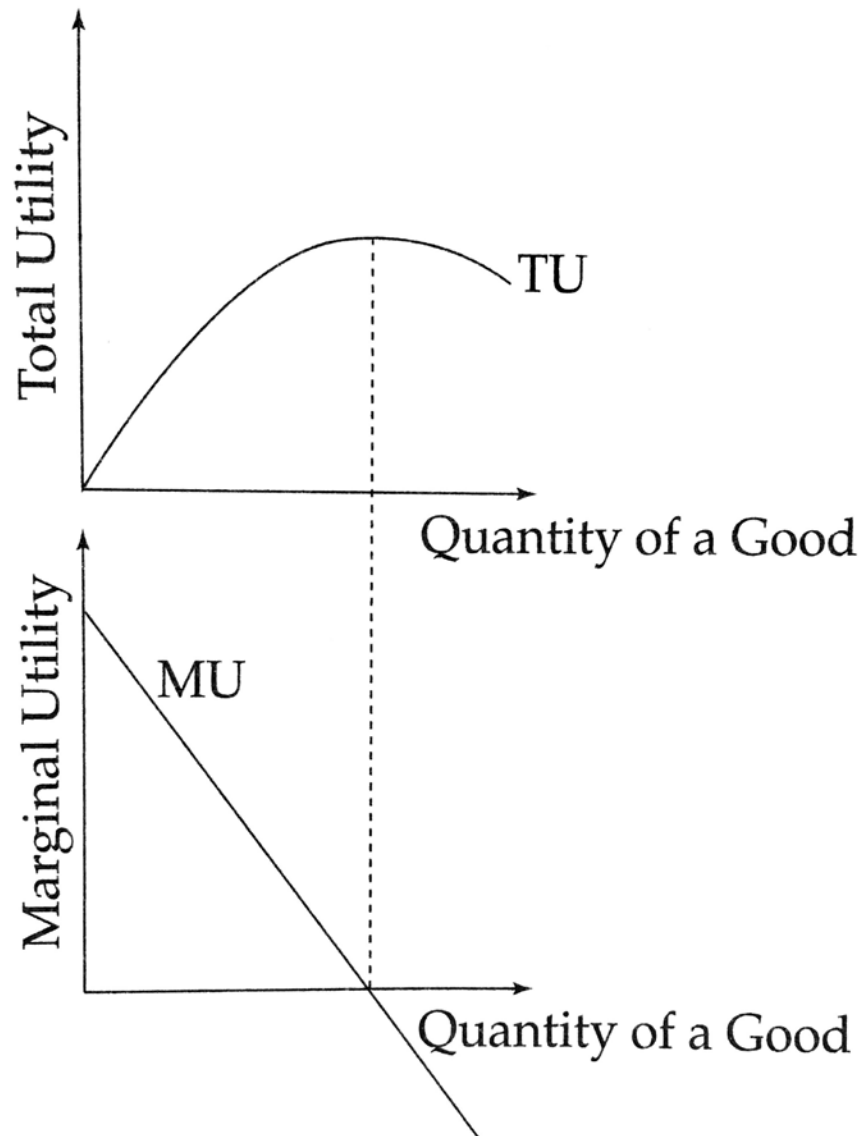
VII. Demand shifters to the right (opposite will shift D in)

- a. Positive change in tastes or preferences
 - i. E.g. due to a successful marketing campaign
- b. Increase in the price of substitute goods
 - i. E.g. if the price of peanut butter increases, demand for Nutella will increase
- c. Decrease in the price of complements
 - i. E.g. if the price of jelly decreases, demand for peanut butter will increase
- d. Increase in income for normal goods
 - i. Goods that consumers buy more of when income increases
 - ii. E.g. higher incomes might lead to increased demand for iPhones
- e. Decrease in income for inferior goods
 - i. Goods that consumers buy more of when income decreases
 - ii. E.g. lower incomes might lead to increased demand for Spam
- f. Increase in the number of buyers in the market
 - i. More individual demand curves are added to produce the market demand curve
- g. Expectations of higher future income
 - i. Will spend more now
- h. Expectations of higher future prices
 - i. Expectations of future shortages
- j. Lower taxes or higher subsidies

EXAMPLE: Summation of Individual Demand Curves

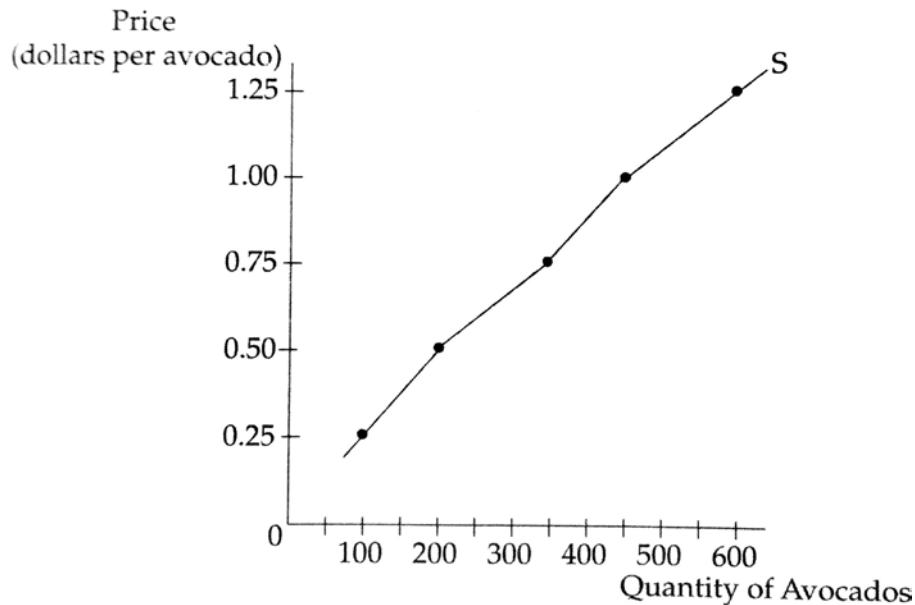


GRAPH: Marginal Utility (MU) vs. Total Utility



- I. Marginal utility
 - a. Additional utility gained from consuming one more unit of a good
 - b. MU at a particular quantity is the slope of the total utility curve at that quantity
- II. Total utility
 - a. Found by adding the MU values gained from each of the units consumed
- III. When MU is positive, total utility is increasing
- IV. When MU is zero, total utility is maximized
- V. When MU is negative, total utility is decreasing

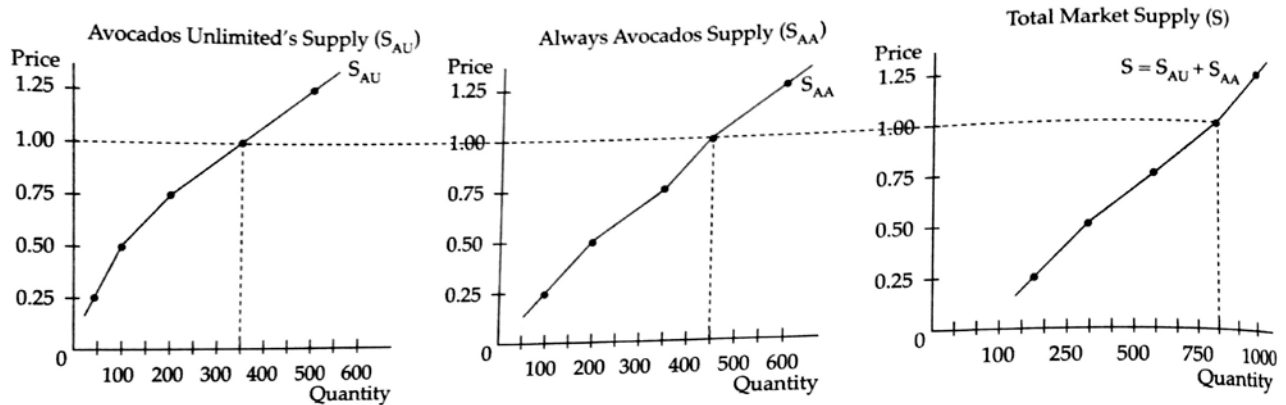
GRAPH: Supply Curve



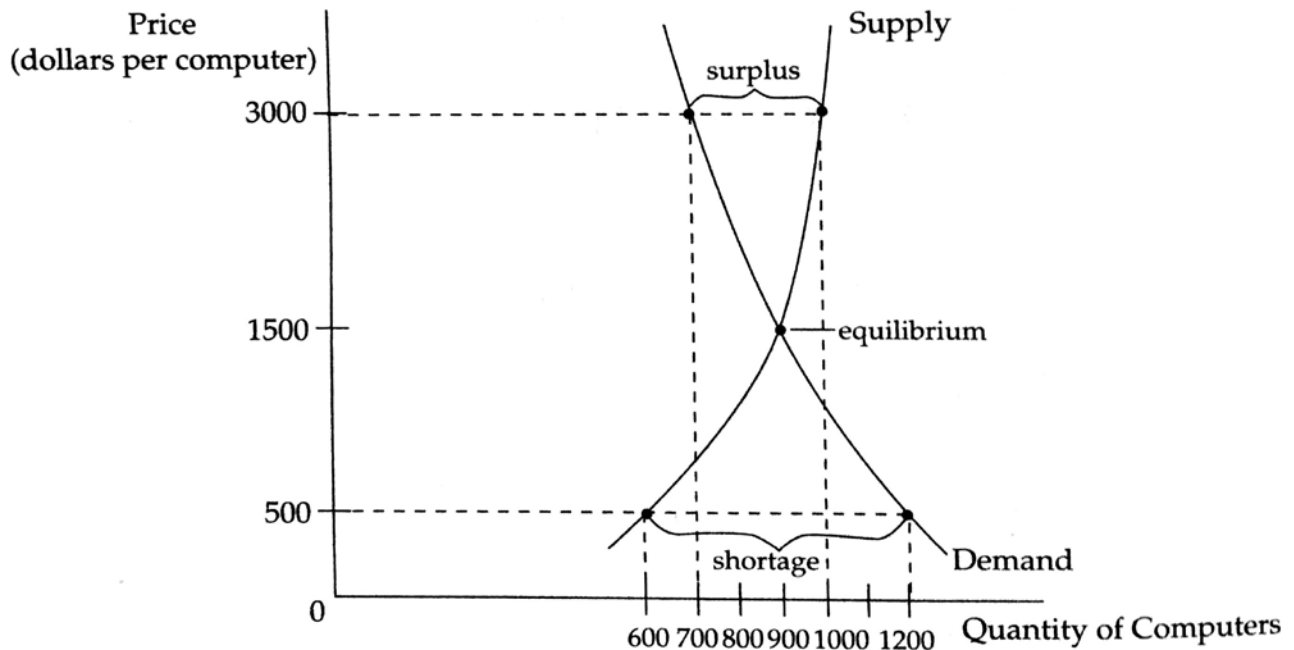
- I. Displays the relationship between price and quantity supplied (Q_S) of a good
- II. Law of supply
 - a. As price increases, the quantity of a good supplied will increase and vice versa
- III. Marginal cost
 - a. Additional cost of producing another unit
 - b. Increases as Q_S increases so higher prices are needed to incentivize more production
 - i. Opportunity cost continually increases
 - ii. Each additional unit of input produces less output
 - iii. Firms run into redundancy and congestion
- IV. Market supply curve
 - a. Total quantities of a good that suppliers are willing and able to provide at various prices
 - b. **Horizontal** summation of individual firm's supply curves
- V. Supply shifters to the right (opposite will shift S in)
 - a. Decrease in input costs
 - i. E.g. if wages associated with the production of a good fall
 - b. Improvement in technology
 - c. Expectations of lower prices in the future
 - d. Increase in the number of sellers
 - i. More individual supply curves are added to produce the market supply curve

- e. Decrease in the price of “substitutes in production” (less common)
 - i. E.g. if a firm produces both milk and cheese, and the price of milk falls, then more cheese will be supplied b/c the supplies can make more money off of the cheese
- f. Increase in the price of “joint products” (less common)
 - i. E.g. if a firm produces both leather and beef, and the price of leather increases, then more cows will be killed and the supply of beef also increases
- g. Lower taxes or higher subsidies

EXAMPLE: Summation of Individual Supply Curves

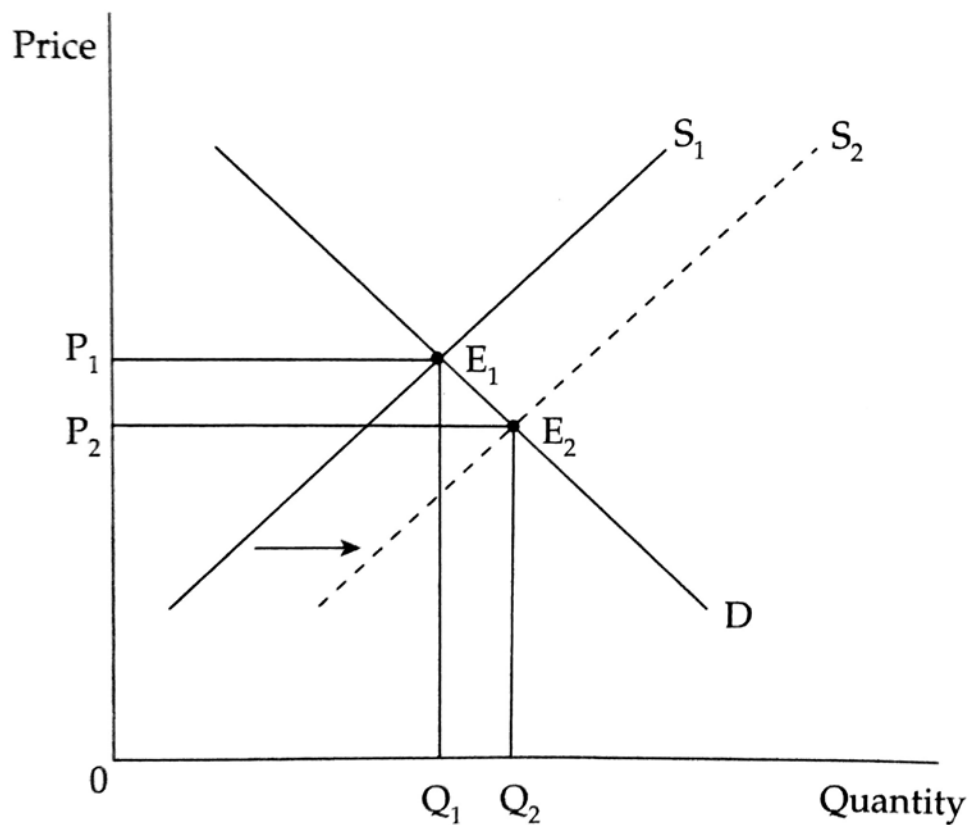


GRAPH: Supply and Demand



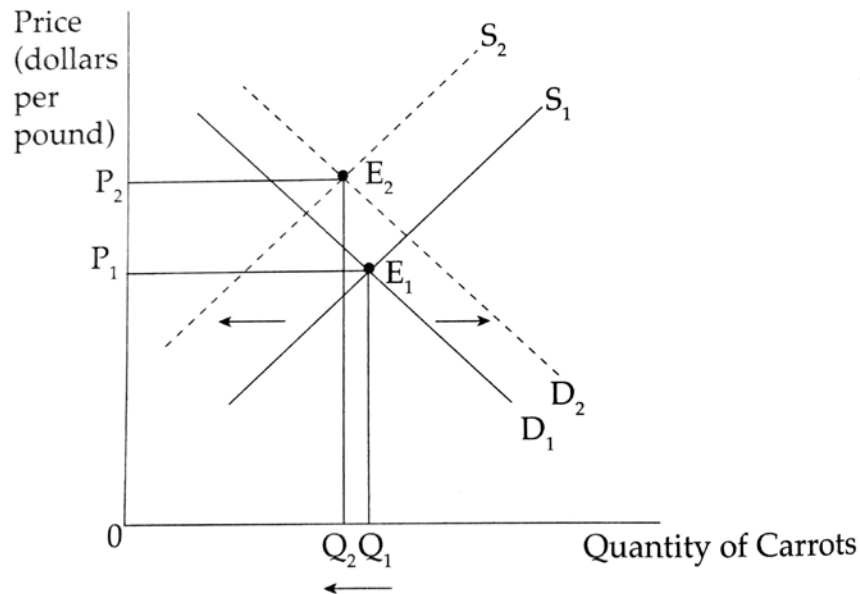
- I. Market equilibrium
 - a. Point of intersection between the supply and demand curves
 - b. At the market equilibrium price (P_e), quantity demanded = quantity supplied
- II. Surplus
 - a. Occurs when price is greater than P_e
- III. Shortage
 - a. Occurs when price is lower than P_e

EXAMPLE: Supply or Demand Shifting



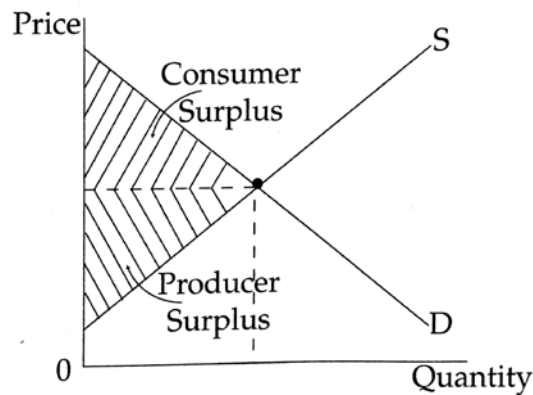
- I. Important to distinguish between **movement** on the supply/demand curves **and actual shifts** of the supply/demand curves
 - a. Movement along a stationary curve represents a change in Q_S or Q_D
- II. When the supply curve shifts from S_1 to S_2 , market equilibrium moves from E_1 to E_2
- III. Thus P_e moves from P_1 to P_2 and quantity demanded changes from Q_1 to Q_2
 - a. **This is not a shift of the demand curve but rather a shift on the demand curve**

EXAMPLE: Supply and Demand Shifting



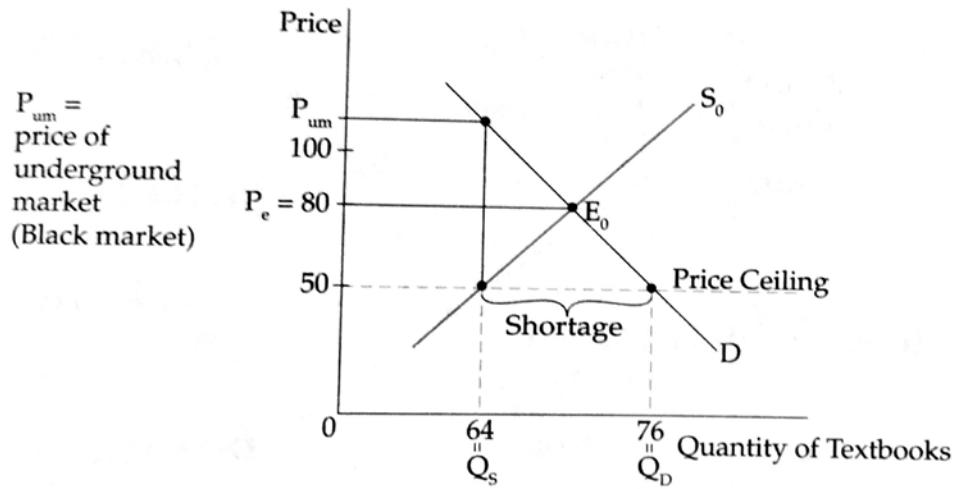
- I. **Make sure you are shifting the correct curve(s) when working with these problems**
- II. Indeterminate
 - a. When both supply and demand shift, and you don't know the size of the shifts, either the resulting P_e or Q_e will be indeterminate

GRAPH: Consumer and Producer Surplus



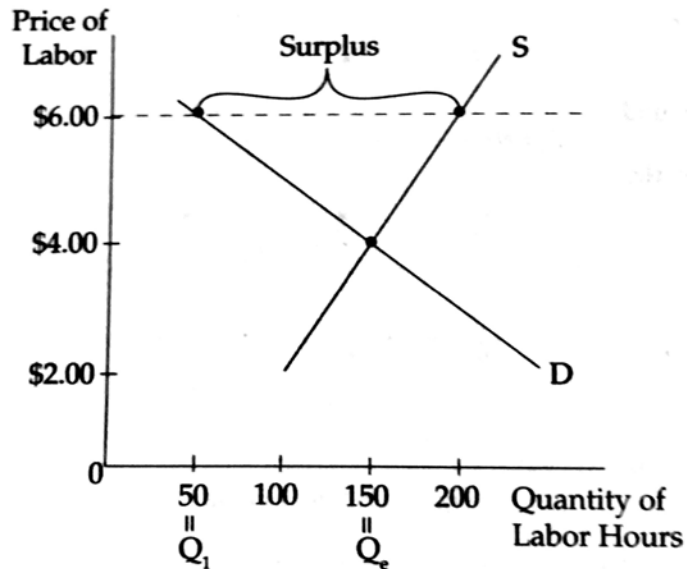
- I. Consumer surplus
 - a. Value received from the purchase in excess of what is paid for it
- II. Producer surplus
 - a. Difference between the price a seller receives and the minimum price for which a seller would be willing to supply that good

GRAPH: Price Ceilings



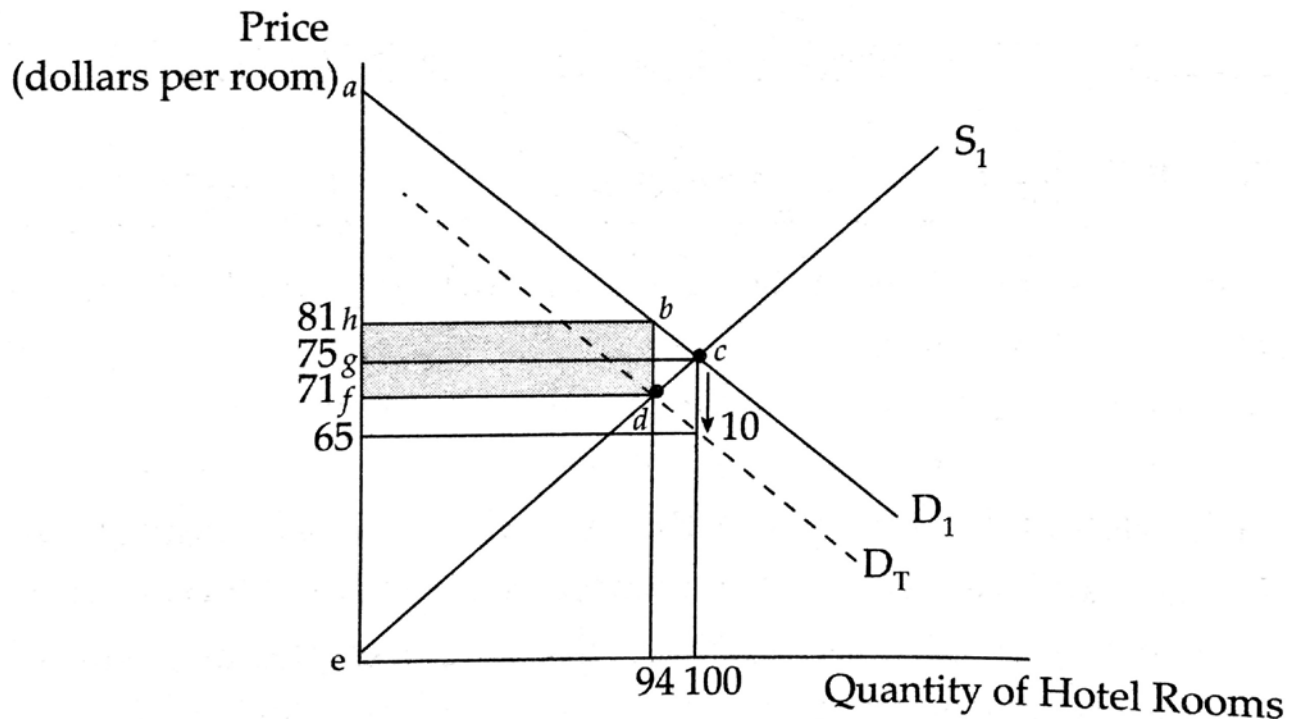
- I. Non-effective price ceiling
 - a. Price ceiling is above P_e
- II. Effective price ceiling
 - a. Price ceiling is below P_e
 - b. Provide lower costs for consumers
 - c. Leads to a shortage in the market as $Q_D > Q_S$
 - d. Can also result in illegal black market activity
 - i. Sell goods for a higher price than the price ceiling

GRAPH: Price Floors



- I. Non-effective price floor
 - a. Price floor is below P_e
- II. Effective price floor
 - a. Price ceiling is above P_e
 - i. E.g. minimum wage
 - b. Leads to a surplus in the market as $Q_S > Q_D$

EXAMPLE: Tax on Buyers (Demand)



- I. Graph represents a tax on the use of hotel rooms, which is imposed on guests
- II. Tax = **vertical distance** between the two demand curves
 - a. Burden of the tax **does not depend** on who has to pay for it
 - b. **Burden of the tax depends on the relative elasticities of the supply and demand curves**
 - i. More elastic curve is burdened by a larger portion of the tax
 - ii. Perfectly inelastic supply curve would place the entire burden of the tax on supplies
 - iii. Perfectly inelastic demand curve would place the entire burden of the tax on buyers
- III. Deadweight loss (DWL)
 - a. Represents the loss to former consumer and producer surplus in excess of the total revenue of the tax: transactions that would have taken place in the market if there was no tax

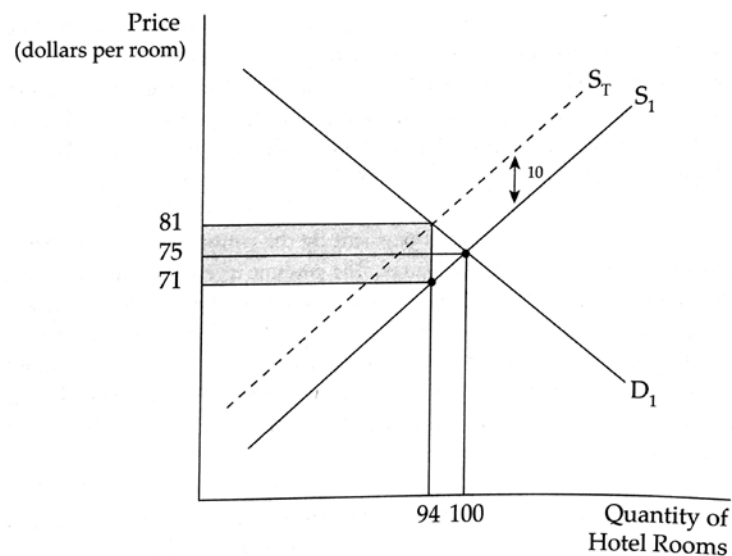
IV. Without the tax

- a. Demand = D_1
- b. Supply = S_1
- c. $P_e = 75$
- d. Consumer surplus = ACG
- e. Producer surplus = GCE

V. With the tax

- a. Demand = D_T
- b. Supply = S_1
- c. $P = P_e + tax = \$71 + \$10 = \$81$
 - i. Price consumers have to pay has increased by \$6, from \$75 to \$81
 - ii. Price suppliers receive has decreased by \$4, from \$75 to \$71
- d. Consumer surplus = ABH
- e. Producer surplus = FDE
- f. Tax revenue = tax amount \times quantity = $\$10 \times 94 = \940
- g. DWL = BCD

EXAMPLE: Tax on Suppliers (Supply)



- I. Graph represents a tax on the use of hotel rooms, which is imposed on the hotels
- II. Same result as a \$10 tax on hotel guests
- III. See “EXAMPLE: Tax on Buyers (Demand)” for more info on taxes

Micro Unit 3: Production, Costs, and Elasticity

Elasticity

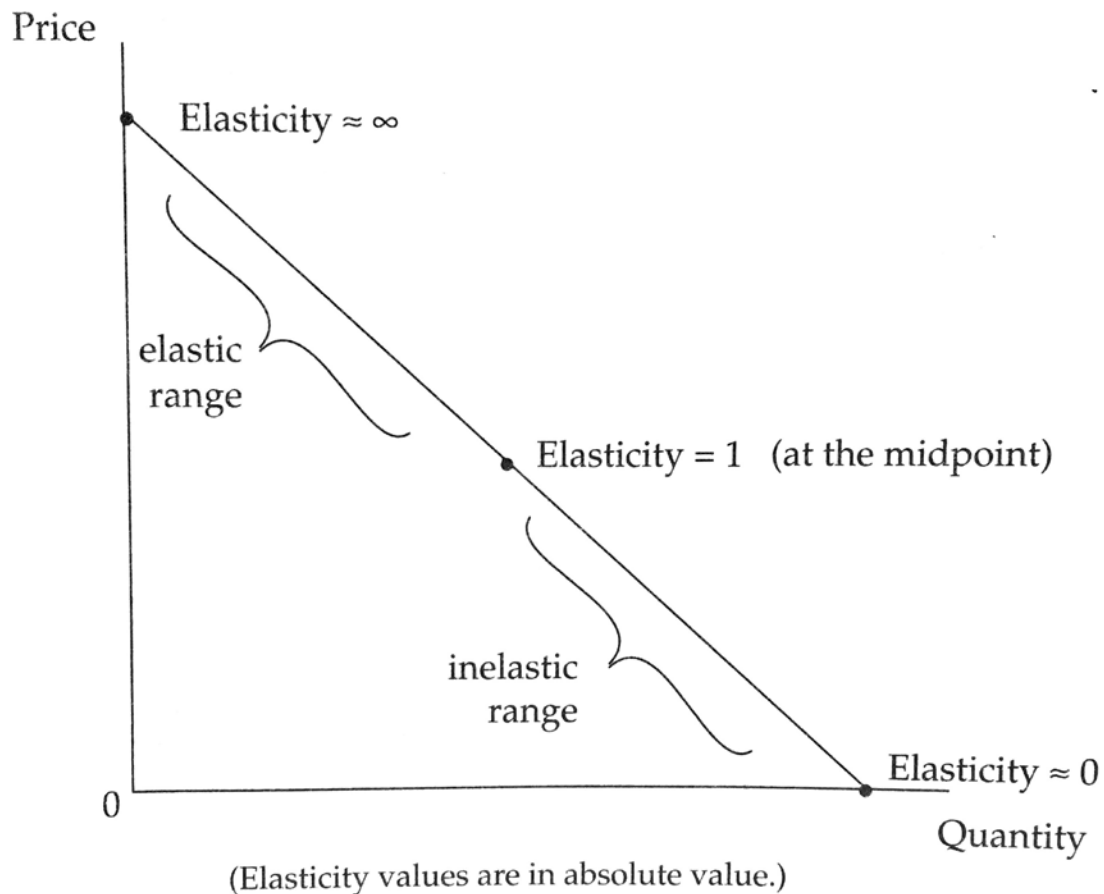
- I. Measure of how responsive something is to various changes

Price Elasticity of Demand

- I. Indicates how responsive the Q_D of a good is to changes in P
- II. Higher price elasticity of demand (opposite will yield lower price elasticity of demand)
- High number of close substitutes
 - Higher proportion of income spent on the good
 - Consumers are more sensitive to price changes at higher price levels
 - Longer time
 - More time consumers have to adapt, the more they are able to learn about the good and find cheaper alternatives
 - Luxury good
 - The less essential a good is, the more likely consumers are willing to forego the good when it becomes more expensive
- III. Price elasticity of demand = $\frac{\% \Delta Q_D}{\% \Delta P} = \frac{\frac{\Delta Q_D}{Q_{old}}}{\frac{\Delta P}{P_{old}}}$
- Always negative b/c the price and quantity demanded are inversely related
 - Elastic
 - $|Price\ elasticity| > 1$
 - Unit elastic
 - $|Price\ elasticity| = 1$
 - Inelastic
 - $|Price\ elasticity| < 1$
 - Perfectly elastic
 - $|Price\ elasticity| = \infty$
 - Any increase in price will result in a quantity demand of zero
 - Demand curve is a **horizontal line**
 - Perfectly inelastic

- i. $|Price\ elasticity| = 0$
 - ii. Price has no influence on quantity demanded
 - iii. Demand curve is a **vertical line**
- g. Relates to the slope of the demand curve **but does not equal** the slope of the demand curve
- i. Steeper slope = less elastic

GRAPH: Price Elasticity of Demand



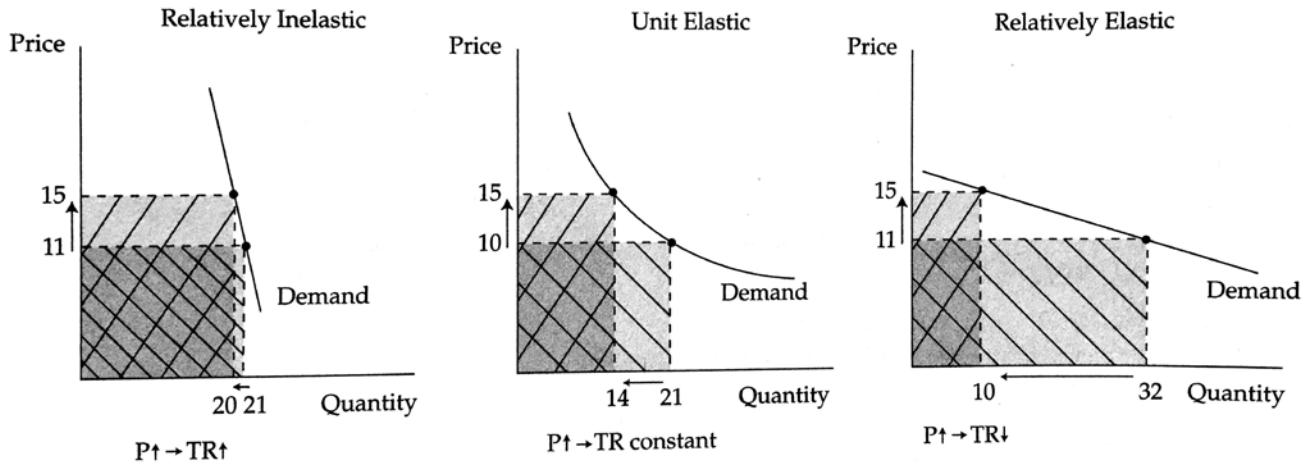
- I. Elasticity determines what happens when price changes
- a. **Firms will always produce in the elastic portion of the demand curve**
 - b. Total revenue test
 - i. Total revenue (TR) = price \times quantity
 - ii. Elastic portion of demand curve
 - 1. TR increases when price increases and vice versa
 - iii. Unit elastic portion of demand curve
 - 1. TR stays constant with price changes

iv. Inelastic portion of demand curve

1. TR decrease when price increases and vice versa

II. As we move left to right along a demand curve, the elasticity will go from negative infinity to zero²

EXAMPLE: Total Revenue Test



Price Elasticity of Supply

I. Indicates how responsive the Q_S of a good is to changes in P

II. Price elasticity of demand = $\frac{\% \Delta Q_S}{\% \Delta P} = \frac{\frac{\Delta Q_S}{Q_{old}}}{\frac{\Delta P}{P_{old}}}$

- a. Always positive b/c the price and quantity supplied are directly related
- b. Elastic
 - i. *Price elasticity* > 1
- c. Unit elastic
 - i. *Price elasticity* = 1
- d. Inelastic
 - i. *Price elasticity* < 1
- e. Perfectly elastic
 - i. *Price elasticity* = ∞
 - ii. Any decrease in price will result in a quantity supplied of zero

² For this particular graph, the given elasticity values are in absolute value.

- iii. Supply curve is a **horizontal line**
- f. Perfectly inelastic
 - i. *Price elasticity* = 0
 - ii. Price has no influence on quantity supplied
 - iii. Supply curve is a **vertical line**
- g. Relates to the slope of the supply curve **but does not equal** the slope of the demand curve
 - i. Steeper slope = less elastic

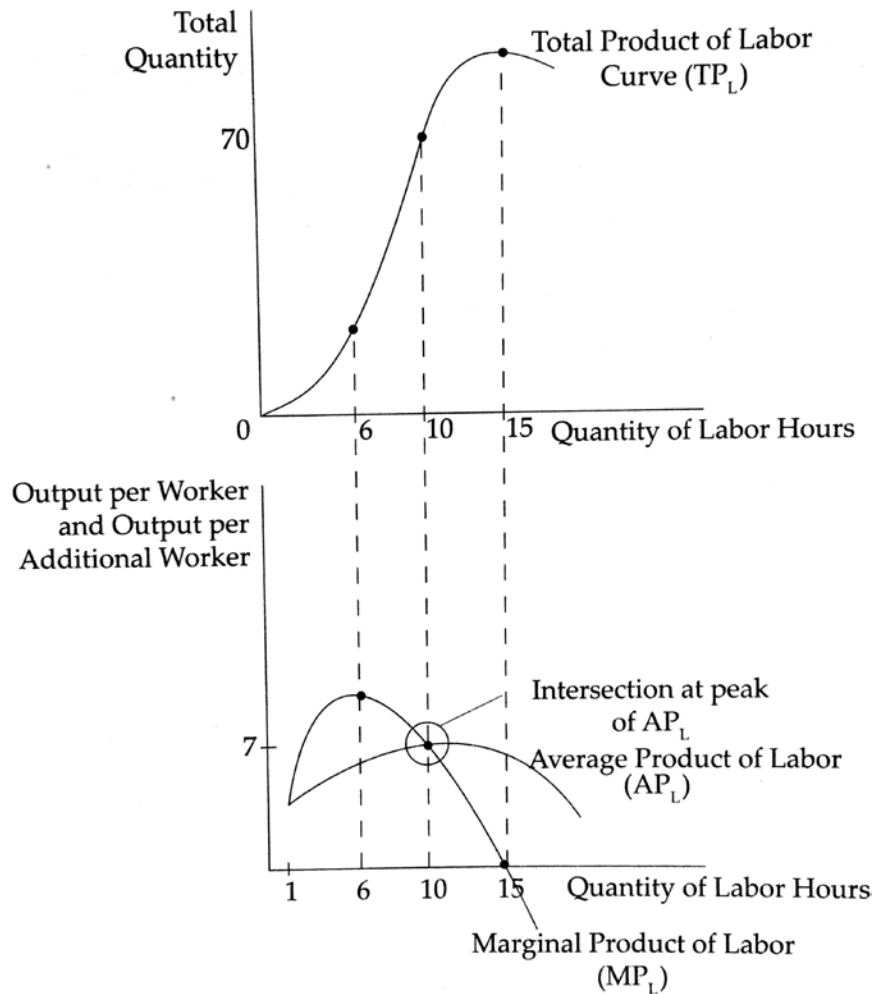
Income Elasticity of Demand

- I. Indicates how responsive the Q_D of a good is to changes in income
- II. Income elasticity of demand = $\frac{\% \Delta Q_D}{\% \Delta I} = \frac{\frac{\Delta Q_D}{Q_{old}}}{\frac{\Delta I}{I_{old}}}$
 - a. Normal good
 - i. Individual purchases more of when income increases
 - ii. *Price elasticity* > 1
 - b. Inferior good
 - i. Individual purchases more of when income decreases
 - ii. *Price elasticity* < 1

Cross-Price Elasticity of Demand

- I. Indicates how responsive the Q_D of a good is to changes in P of another good
- II. Cross-price elasticity of demand = $\frac{\% \Delta Q_D \text{ of Good A}}{\% \Delta P_{\text{Good B}}} = \frac{\frac{\Delta Q_D \text{ of Good A}}{Q_{old \text{ of Good A}}}}{\frac{\Delta P_{\text{Good B}}}{P_{old \text{ of Good B}}}}$
 - a. Substitutes
 - i. Individual purchases less of when the price of another good increases
 - ii. *Cross price elasticity* > 1
 - b. Complements
 - i. Individual purchases more of when price of another good decreases
 - ii. *Cross price elasticity* < 1

GRAPH: Marginal Product and Total Product



I. Marginal product (MP) = $\frac{\Delta total\ product}{\Delta input}$

- a. Additional output produced per when one more unit of an input is added, ceteris paribus
- b. Sometimes called the marginal physical product
 - i. Reminder that dollars aren't involved: just a measure of physical output
- c. Increases with the first few workers as they are able to take advantage of specialization

II. Law of diminishing marginal returns

- a. As the amount of **one input** is increased, incremental gains in output, or marginal returns, will eventually decrease, ceteris paribus
- b. E.g. consider hiring more workers, eventually too many workers leads to boredom and the distraction of other workers

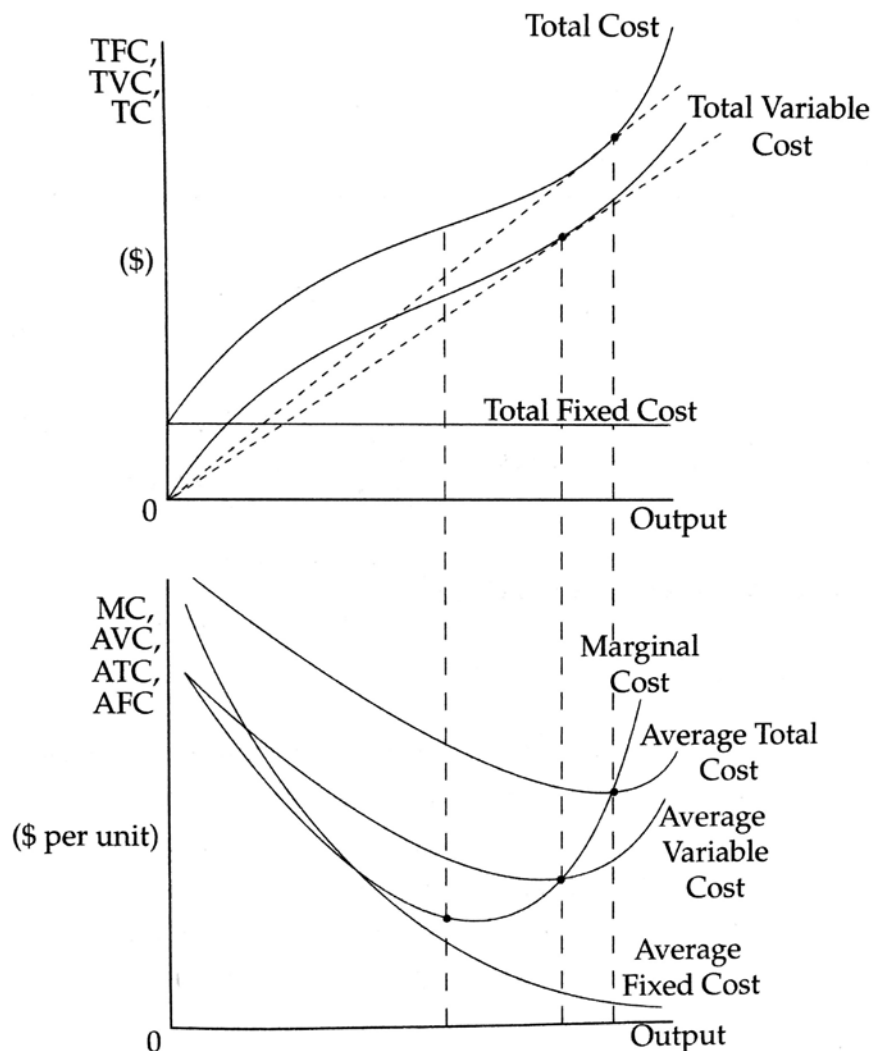
III. Average product (AP) = $\frac{total\ product}{quantity\ of\ input}$

- a. Rises when MP is above it and falls when MP is below it
 - i. Think of the MP curve as your score on each new AP economics test, and the AP curve as your average grade in AP economics
- b. Reaches its maximum when it intersects the MP curve

IV. Total product curve

- a. Shows the relationship between the total amount of output produced and number of units of an input used, ceteris paribus
- b. Slope = marginal product
- c. Rises when MP is positive and vice versa
- d. Remains constant when MP is zero

GRAPH: Marginal Cost and Total Cost



- I. Fixed costs (FC)
 - a. Stay constant when more output is produced
 - b. E.g. rent for machines
 - c. Continually falls as Q increase b/c the same fixed cost is divided by a larger and larger Q
 - d. Average fixed cost (AFC) = $\frac{\text{total fixed cost}}{\text{quantity of output}}$
- II. Variable costs (VC)
 - a. Change as more output is produced
 - b. E.g. ingredients for donuts
 - c. Average variable cost (AVC) = $\frac{\text{total variable cost}}{\text{quantity of output}}$
 - i. Falls when MC is below it and rises when MC is above it
 - ii. Reaches its minimum when it intersects the MC curve
- III. Total costs (TC) = total fixed costs + total variable costs
 - a. TC = FC when output is zero b/c there are no variable costs
 - b. Average total cost (ATC) = $\frac{\text{total cost}}{\text{quantity of output}}$
 - i. Falls when MC is below it and rises when MC is above it
 - ii. Reaches its minimum when it intersects the MC curve
- IV. Marginal costs (MC) = $\frac{\Delta TC}{\Delta Q} = \frac{\Delta TVC}{\Delta Q}$
 - a. Decrease in the beginning b/c the first few units of input produce more additional output than the units before them³
 - b. Eventually increases due to the law of diminishing marginal returns

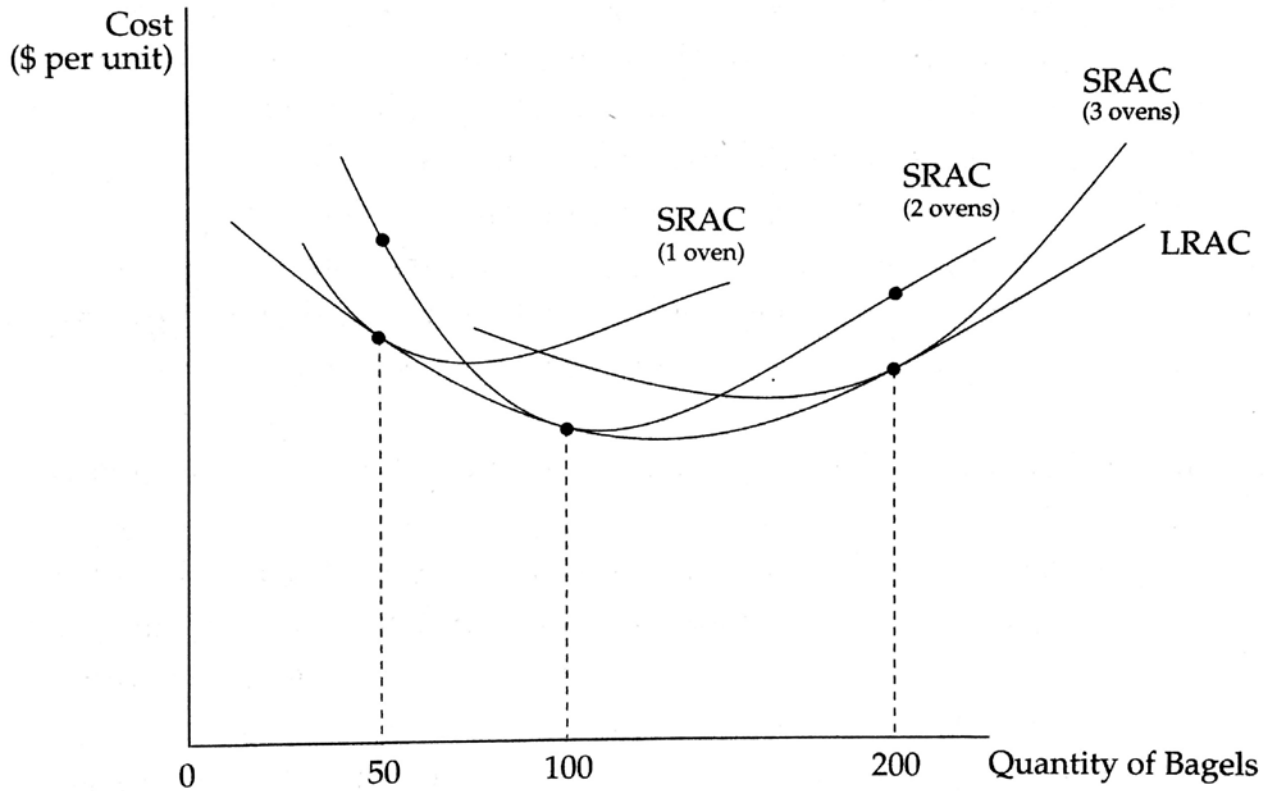
Short Run vs. Long Run

- I. Short run
 - a. Amount of at least one input is constant
 - b. E.g. labor is variable in the short run but capital is fixed
- II. Long run
 - a. Can change the amounts of all inputs

³ Note the relationship with the marginal product curve, which was explained earlier. When MP is rising, MC is falling and vice versa. This is due to the law of diminishing marginal returns.

i. No fixed costs

GRAPH: Economies of Scale



- I. LRAC = long run average cost
- II. SRAC = short run average cost
 - a. Capital e.g. ovens is fixed which accounts for the three different curves
 - b. Each curve represents a stage in the bagel shop when it has a certain amount of ovens

Micro Unit 4: Perfect Competition

Key Terms

- I. Economies of scale
 - a. Occur during the range of output where LRAC slopes downward
 - b. Can result from increasing returns to scale
- II. Diseconomies of scale
 - a. Occur during the range of output where LRAC slopes upward
- III. Increasing returns to scale
 - a. Output increases proportionally more than increases in all inputs
 - i. E.g. doubling all inputs yields three times the amount of output
 - b. Often confused with increasing marginal returns
 - i. Only involved an increase in one input, ceteris paribus
- IV. Decreasing returns to scale
 - a. Output increases proportionally less than increase in all inputs
 - i. E.g. doubling all inputs yields 1.5 times the amount of output
- V. Constant returns to scale
 - a. Output increase proportionally to increases in all inputs
 - i. E.g. doubling all inputs yields two times the amount of output
- VI. Productive efficiency
 - a. $P = \text{minimum ATC}$
- VII. Allocation efficiency
 - a. $P = MC$
- VIII. Increasing cost firm (less common)
 - a. Firm facing decreasing returns to scale
- IX. Decreasing cost firm (less common)
 - a. Firm facing increasing returns to scale
- X. Increasing cost industry (less common)
 - a. Experiences increases in average production costs as industry output increases
 - b. More likely to occur in large industries where input prices increases with higher demand
 - i. E.g. automobiles

c. Upward sloping long run supply curve

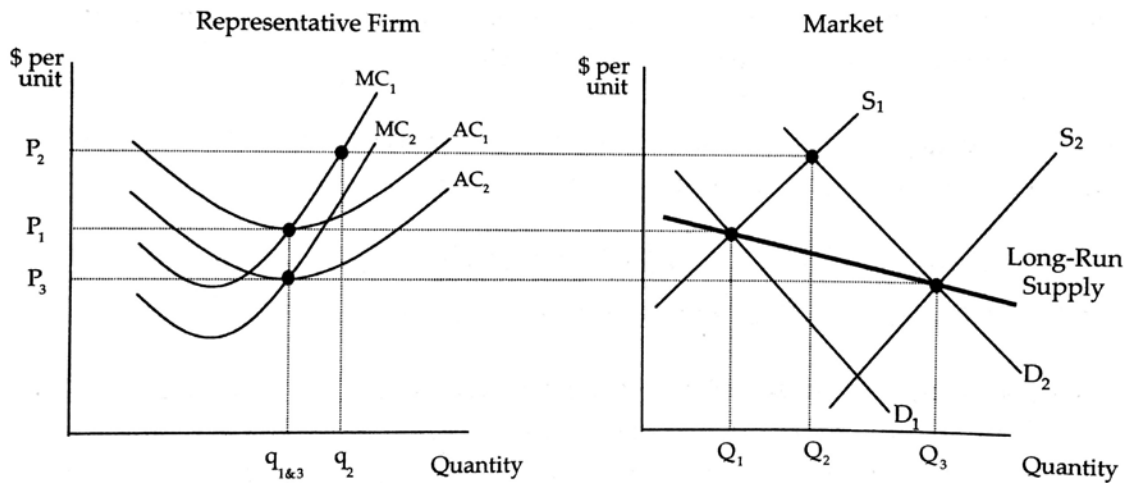
XI. Decreasing cost industry (less common)

- a. Experiences decreases in average production costs as industry output increases
- b. More likely to occur in industries where production is only possible at a mass level
 - i. E.g. solar panels
- c. Downward sloping long run supply curve

XII. Constant cost industry (less common)

- a. Does not experience changes in production costs as industry output increases
- b. Horizontal sloping long run supply curve

EXAMPLE: Decreasing Cost Industry (less common)



I. Short run

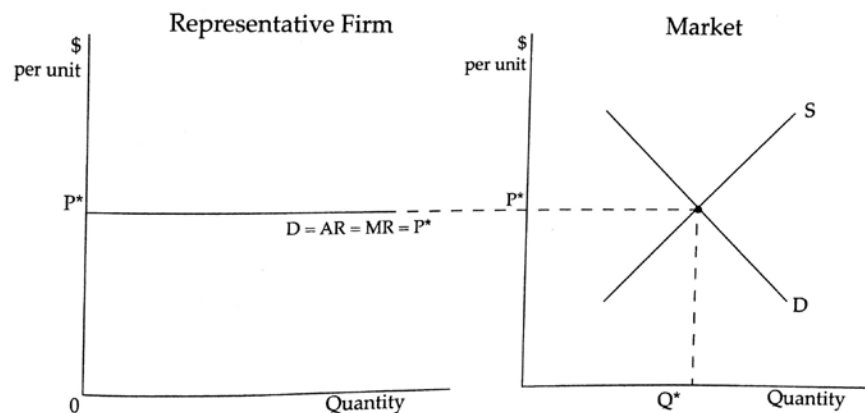
- a. Demand = D_1
- b. Price = P_1
- c. Supply = S_1
- d. Firm quantity = q_1
- e. Market quantity = Q_1

II. Long run

- a. Demand = D_2
 - i. Suppose there is an increase in demand
- b. Price = $P_2 \rightarrow P_3$
 - i. Price initially rises to P_2

1. At this price, firms are earning an economic profit
 2. Availability of profits will draw new firms, causing supply to shift out
- ii. B/c this is a decreasing costs industry, even when price returns to P_1 (due to the supply curve shifting out), firms are still making economic profit as their costs will be lower than in the beginning when P_1 corresponded to zero economic profit
 - iii. Supply curve will continue to shift out until falling prices correspond to falling average and marginal costs, and thus zero economic profit earned by firms
- c. Supply = S_2
 - d. Firm quantity = $q_2 \rightarrow q_3$
 - i. Firm quantity initially rises to q_2 but then falls to q_3
 - e. Market quantity = $Q_2 \rightarrow Q_3$
 - i. Market quantity initially rises to Q_2 and then increases even more to Q_3

GRAPH: Perfect Competition



- I. Key characteristics
 - a. Many sellers
 - i. E.g. agricultural goods
 - b. Homogeneous, or identical, products
 - c. Firms are price takers
 - d. Free entry and exit from market
 - e. Zero economic profits in long run
 - i. Firms will enter the market to compete away existing profits
 - ii. Firms will leave the market to eliminate any losses

II. Mr. DARP⁴

a. Marginal revenue = firm demand curve = average revenue = market price

b. $MR = \frac{\Delta TR}{\Delta Q}$

c. $AR = \frac{TR}{Q}$

III. Market S and D curves are the horizontal summations of individual firm's S and Demand curves⁵

IV. Economic profit⁶ = total revenues – total costs

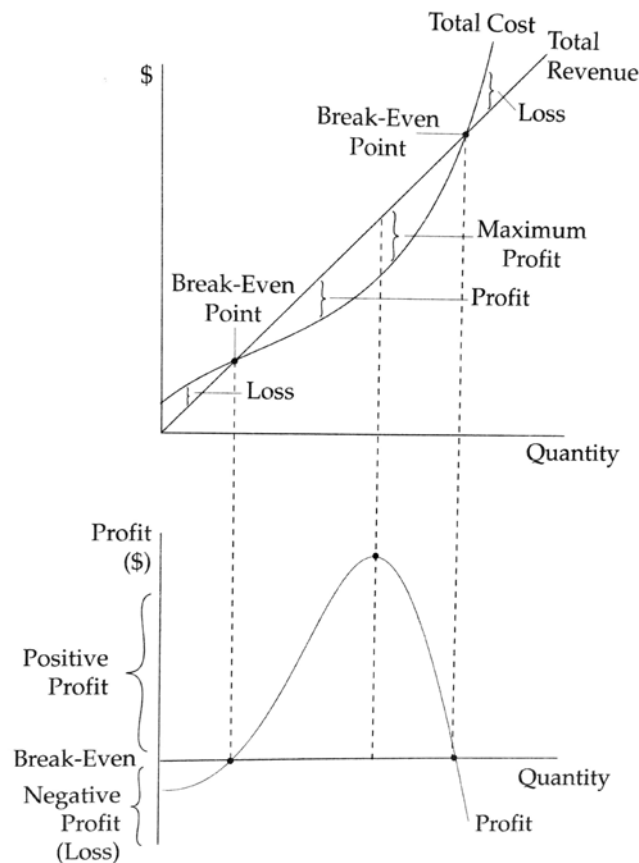
a. **Implicit costs i.e. opportunity costs are included in total costs**

b. Zero economic profit = you couldn't be making any more money doing anything different

c. Normal profit = zero economic profit

V. Accounting profit = total revenues – explicit costs

GRAPH: Total Cost and Total Revenue



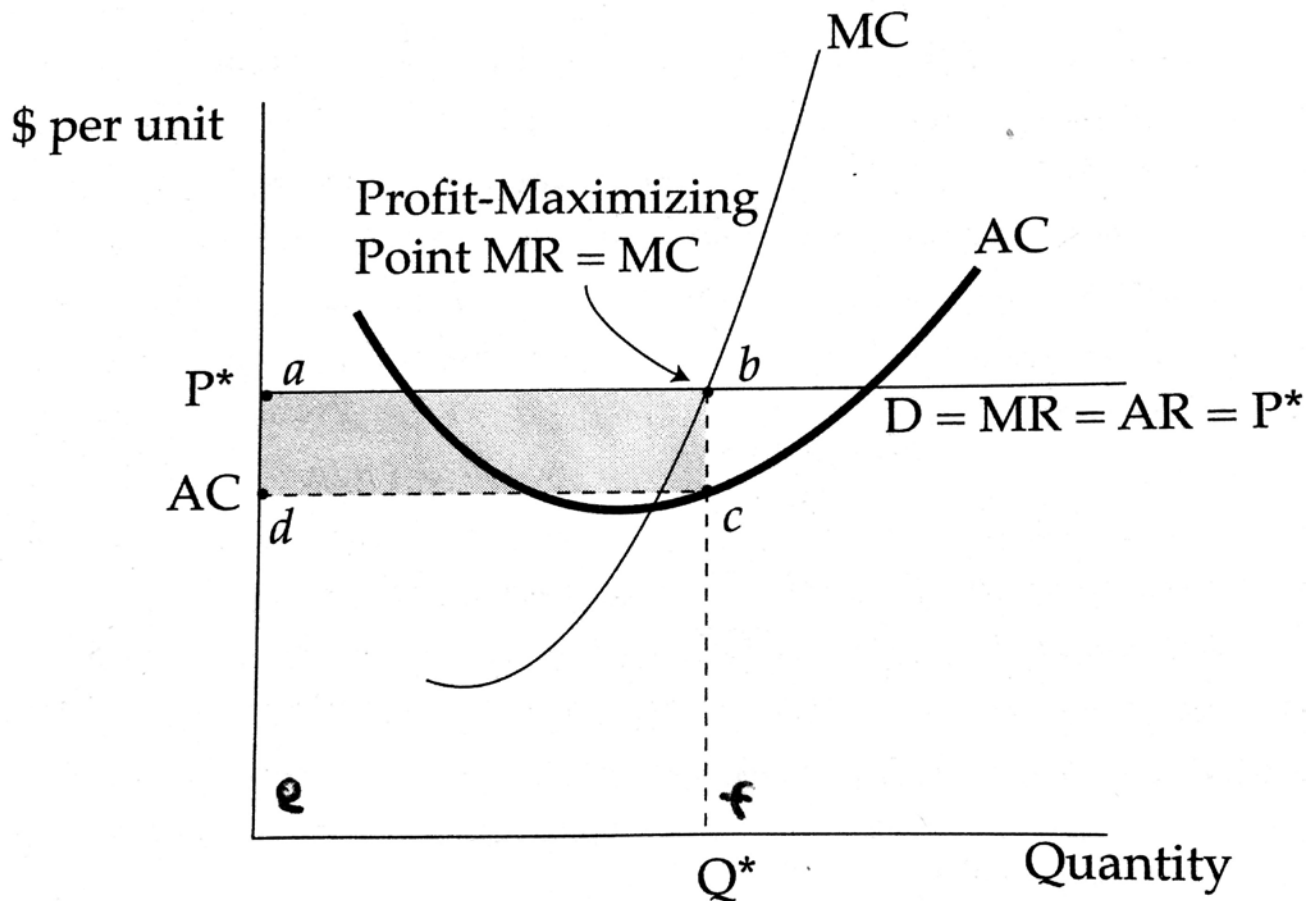
⁴ Every time you encounter a questions on perfect competition, make sure you use Mr. Darp!

⁵ This was covered earlier in Unit 2.

⁶ In economics, unless told otherwise, assume profit is referring to economic profit.

- I. When TR is greater than TC, vertical distance represents profits
- II. When TR is less than TC, vertical distance represents losses
- III. Firms want to produce where profit is maximized
 - a. $MR = MC$
 - i. In other words: slope of the TR curve = slope of the total cost curve

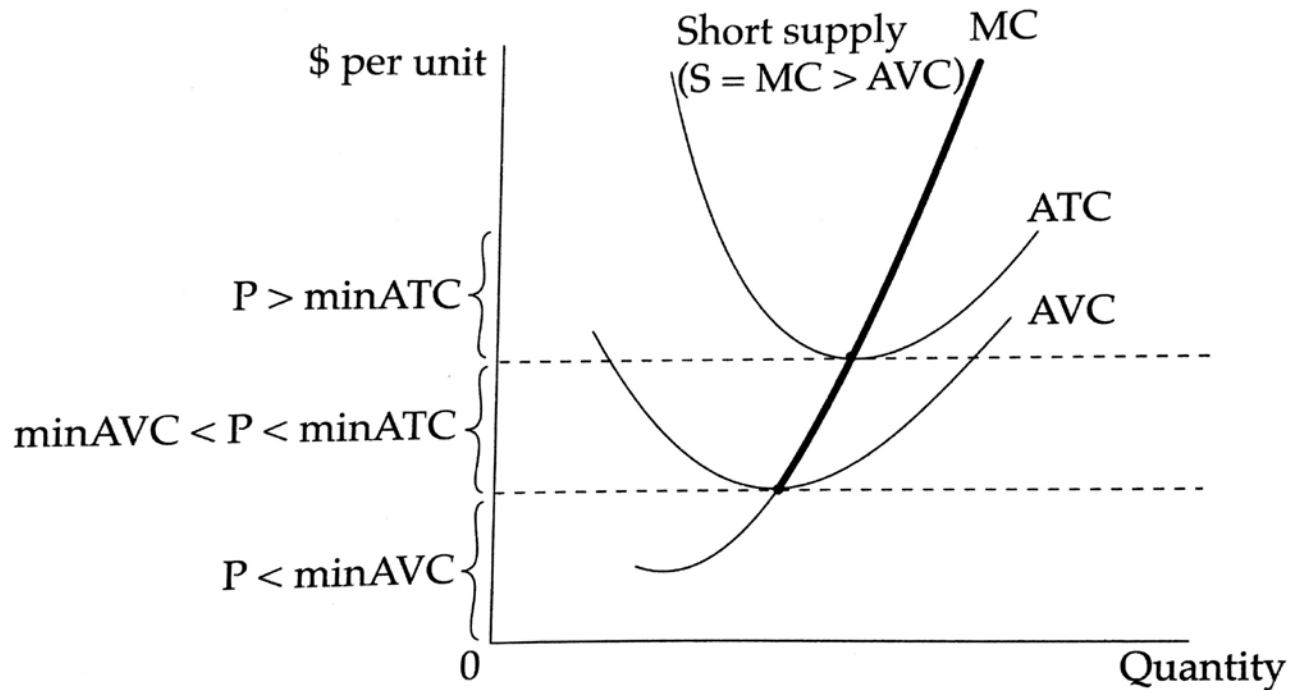
GRAPH: Perfect Competition – Profit Maximizing Firm⁷



- I. Total profit is positive when $P > ATC$
 - a. In this graph, total profit = $TR - TC = ABFE - DCFE = ABCD$
- II. Total profit is negative when $P < ATC$
- III. Total profit is zero when $P = ATC$

⁷ AC is the same thing as ATC. The corresponding market graph is not shown to the right.

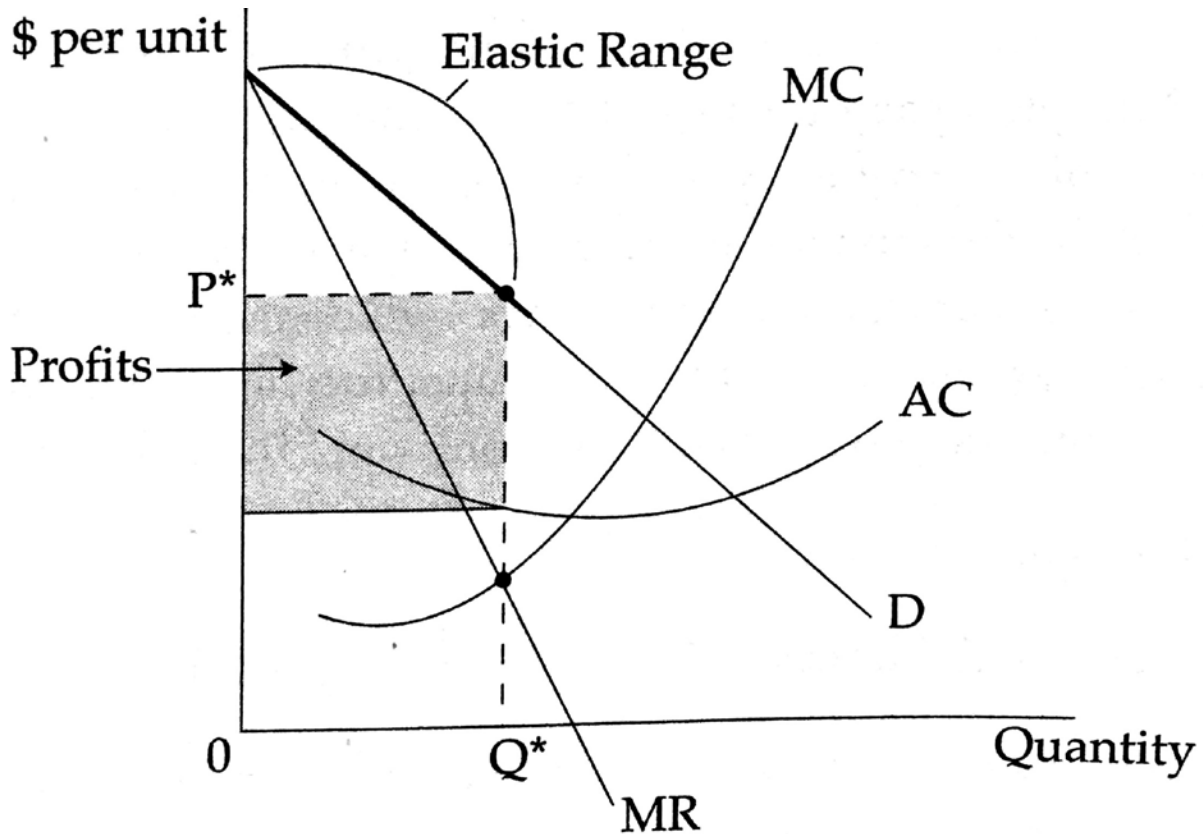
GRAPH: Shut Down Decision



- I. **Short run: depends on whether or not P exceeds AVC**
- II. **Long run: depends on whether or not P exceeds ATC**
- III. $P > ATC$
 - a. Firm is making economic profits
- IV. $AVC < P < ATC$
 - a. Firm is incurring economic losses but will stay open
 - b. Two options in the short run
 - i. Shut down and not incur variable costs, but not obtain any revenue for fixed costs
 - ii. Remain open and cover all of its variable costs (b/c $P > AVC$), and pay off some of its fixed costs with the difference between P and AVC
 - 1. Better of the two alternatives
- V. $P < AVC$
 - a. Firm is incurring economic losses and will shut down as it can't cover its variable costs

Micro Unit 5: Monopolies

GRAPH: Monopoly



I. Key characteristics

- a. Sole provider of a unique product⁸
 - i. E.g. local monopolies such as a the sole movie theater in a small town
- b. Absolute monopolies are rare at the national and international level
- c. Barriers to entry allow economic profits in the long run
 - i. Patents
 - ii. Control of resources
 1. E.g. diamond mines
 - iii. Exclusive licenses
 1. E.g. gov. grants only one company the right to produce electricity

II. Demand curve is downward sloping

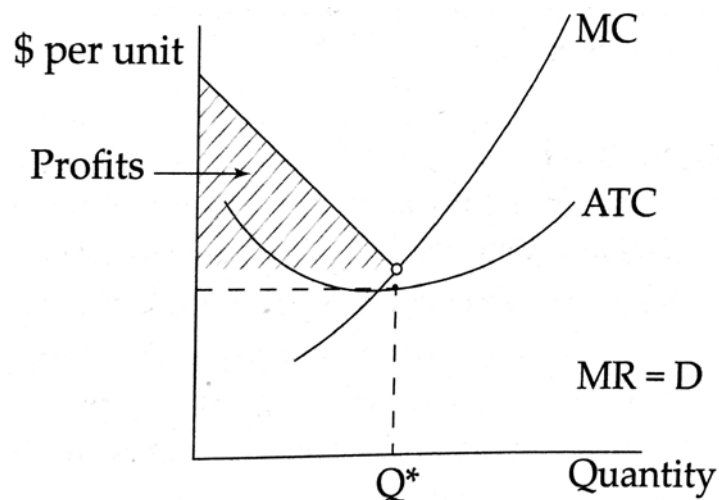
⁸ Just because they are the sole provider of the product, it doesn't mean that monopolies can charge whatever price they want. Consumers will not buy a product if the price is higher than the demand curve.

- a. Lower price must be charged on all previous units to sell additional units
 - b. **Price \neq marginal revenue** at output levels greater than zero
 - i. MR falls as Q increases
- III. Always produces in the elastic portion of the demand curve when maximizing profits
- a. Find where $MR = MC$ to find the quantity of output
 - b. Trace your finger upwards until you hit the demand curve to find price
- IV. **Monopolies produce less and at a higher price than firms in perfect competition**

Price Discrimination

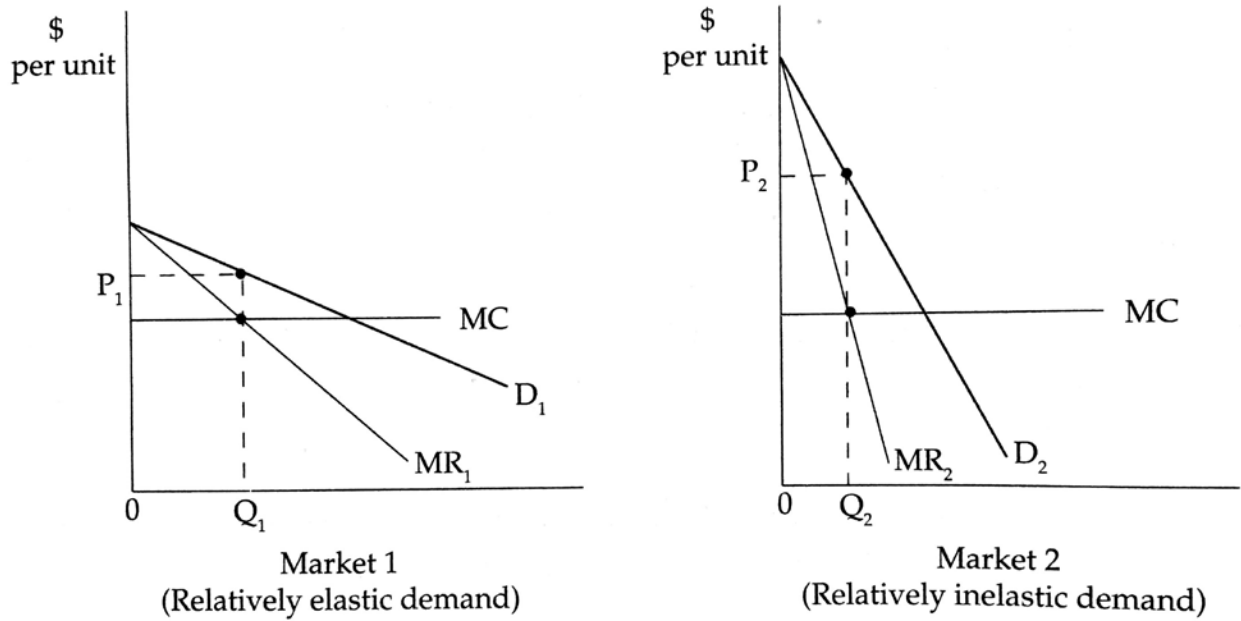
- I. E.g. airlines, car dealers, Uber
- II. Key characteristics
 - a. Firm must have market power: **downward** sloping demand curve
 - b. Buyers with differing demand elasticities must be separable
 - c. Firm must be able to prevent the resale of its goods
 - i. Block those paying the lower price to resell to those willing to pay the higher price
- III. Want to charge customers the most they are willing to pay

GRAPH: Monopoly – Perfect Price Discrimination



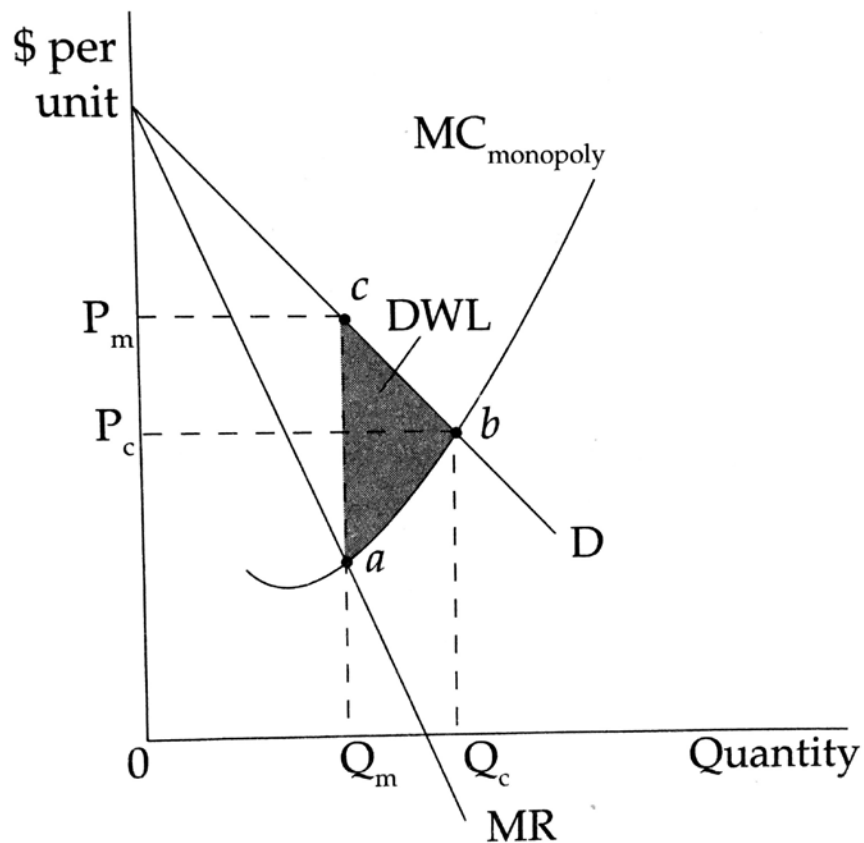
- I. All consumer surplus is transformed into profit
- II. $MR = D$
 - a. No need to lower the price of all units to sell one additional unit

GRAPH: Monopoly – Perfect Price Discrimination w/Differing Demand Elasticities



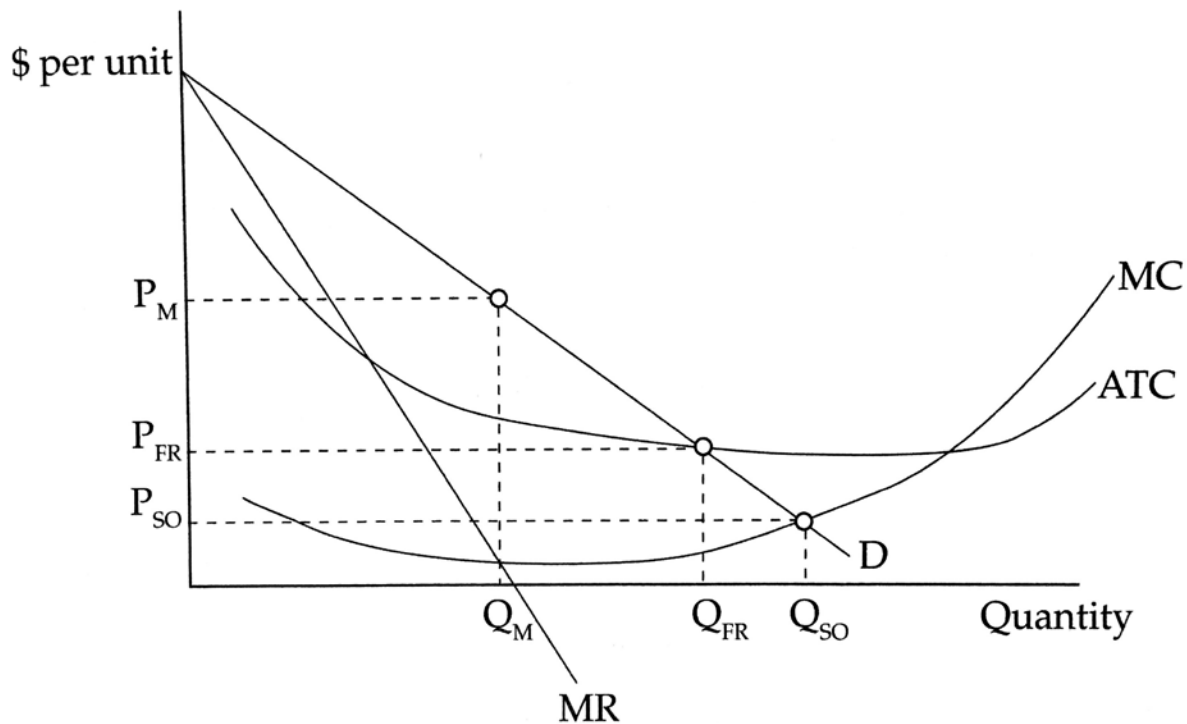
I. The more inelastic the demand, the more consumers pay

EXAMPLE: Government Policy towards Imperfect Competition



- I. Firms with market power can challenge the efficiency of the market if left unchecked
- II. **Monopolies produce less and at a higher price than firms in perfect competition**
- III. Monopolies and their corresponding profits have the potential to motivate research and development expenditures that result in important drug and technology innovation

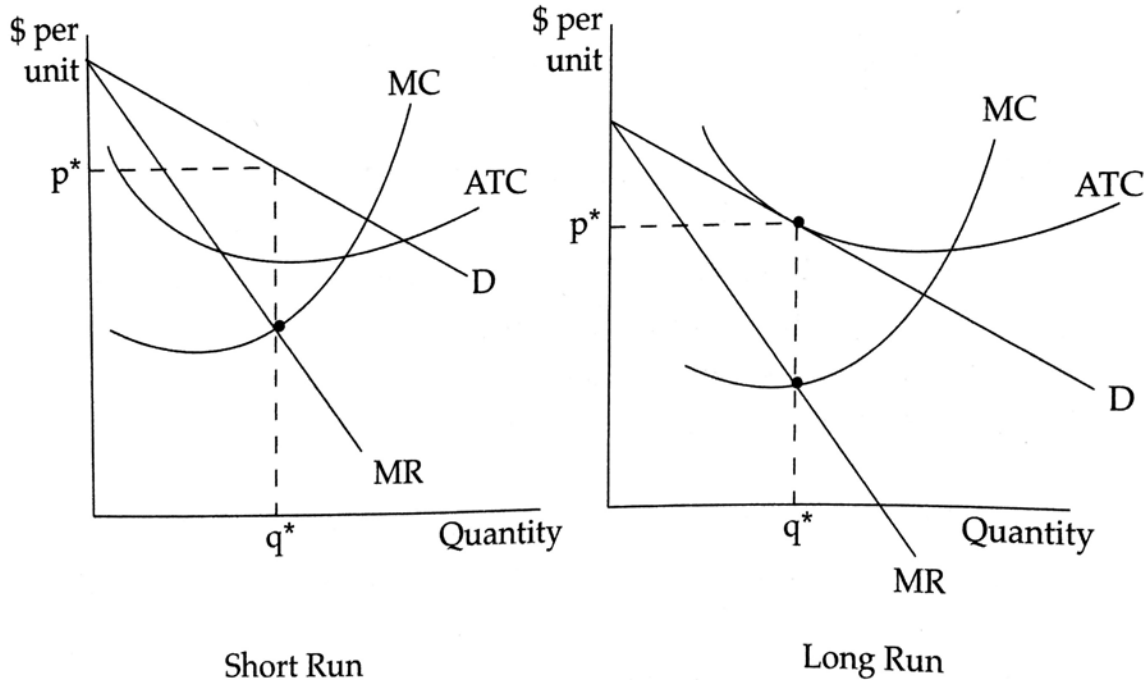
GRAPH: Natural Monopoly



- I. E.g. power generation
- II. Industries where **competition isn't possible due to extremely high fixed costs**
- III. ATC decreases throughout the relevant range of production
- IV. At the socially optimal price ($P_{SO} = MC$), the monopoly is incurring economic losses
- V. At the monopoly price ($MR = MC \rightarrow P_M$), the monopoly is making economic profit but charging too high of a price and producing too low of an output
- VI. Gov. needs to intervene as competition can't influence prices in this situation
 - a. Fair return price = P_{FR}
 - i. Firm will make zero economic profit
 - ii. Middle ground between severe resource misallocation and economic losses

Micro Unit 6: Monopolistic Competition and Oligopolies

GRAPH: Monopolistic Competition



- I. Key characteristics
 - a. Faces more competition than monopolies or oligopolies
 - b. Maintains some market power due to product differentiation
 - i. E.g. restaurants, clothing stores
 - c. Zero economic profits in long run
 - i. Firms will enter the market to compete away existing profits
 - ii. Firms will leave the market to eliminate any losses
- II. Demand curve is downward sloping
 - a. Lower price must be charged to sell additional units
 - b. **Price \neq marginal revenue** at output levels greater than zero
 - i. MR falls as Q increases
- III. Always produces in the elastic portion of the demand curve when maximizing profits
 - a. Find where $MR = MC$ to find the quantity of output
- IV. Trace your finger upwards until you hit the demand curve to find price

Oligopoly

- I. E.g. airlines, Coca-Cola vs. Pepsi
- II. Key characteristics
 - a. Small number of firms selling a homogeneous or differentiated product
 - b. High barriers to entry and high market power
 - c. **Mutualistic interdependence**
 - i. Decision of one firm will highly impact the decisions of other firms

Game Theory

- I. Considers the strategic decision of players (e.g. interdependent oligopolistic firms) in anticipation of their competitors' reactions
- II. Payoff matrix: two by two square
 - a. Details the possible results of varying pricing choices by two entities
 - b. **Isolate one player and one strategy and circle the best choice for the other player**
 - i. It can be helpful to cover up the other side of the square
 - ii. E.g. use circles for player 1 and rectangles for player 2 for their best choices
- III. Dominant strategy
 - a. Choosing one pricing strategy regardless of what the competitor chooses
- IV. Nash equilibrium⁹
 - a. Occurs when two choices appear in the same square of a payoff matrix
 - b. Dominant strategy equilibrium
 - i. Both sides have a dominant strategy, so neither party will deviate from its strategy given the strategy of the other side
 - ii. All dominant strategy equilibriums are Nash equilibriums, but not vice versa
- V. Prisoner's dilemma
 - a. When competing parties forgo an option more beneficial for both parties e.g. Party A and B choose to make \$100 and \$200 instead of \$300 and \$500, respectively
 - b. E.g. arms races
 - i. Both parties are better off with peace

⁹ Rest in peace, John Nash.

EXAMPLE: Payoff Matrix – Dominant Strategy Equilibrium

		Liz	
		High	Low
Bob	High	B: 400 L: 300	B: -800 L: 500
	Low	B: 600 L: -800	B: -500 L: -500

- I. Bob chooses high priced strategy
 - a. Liz makes 300 going high or makes 500 going **low**
- II. Bob chooses low priced strategy
 - a. Liz loses 800 going high or loses 500 going **low**
- III. Liz chooses high priced strategy
 - a. Bob makes 400 going high or makes 600 going **low**
- IV. Liz chooses low priced strategy
 - a. Bob loses 800 going high or loses 500 going **low**
- V. Nash equilibrium
 - a. Both players have a dominant strategy of going low
 - b. Bob ends up losing 500 and Liz ends up losing 500
 - i. This illustrates the prisoner's dilemma
 1. Both players would have been better off going high

EXAMPLE: Payoff Matrix – Non-Dominant Strategy Equilibrium

		Liz	
		High	Low
Bob	High	B: 400 L: 500	B: 50 L: 300
	Low	B: 600 L: 150	B: 100 L: 200

- I. Bob chooses high priced strategy
 - a. Liz makes 500 going **high** or makes 300 going low
- II. Bob chooses low priced strategy
 - a. Liz makes 150 going high or makes 200 going **low**
- III. Liz chooses high priced strategy
 - a. Bob makes 400 going high or makes 600 going **low**
- IV. Liz chooses low priced strategy
 - a. Bob makes 50 going high or makes 100 going **low**
- V. Nash equilibrium
 - a. Bob has a dominant strategy of going low
 - b. Liz goes high when Bob goes high and goes low when Bob goes low

Bilateral Monopoly (less common)

- I. Only one buyer and one seller exist in the same market
- II. Cannot theoretically predict what the final wage of workers will be
 - a. Depends on the relative bargaining skills of both parties

SUMMARY: Market Structures

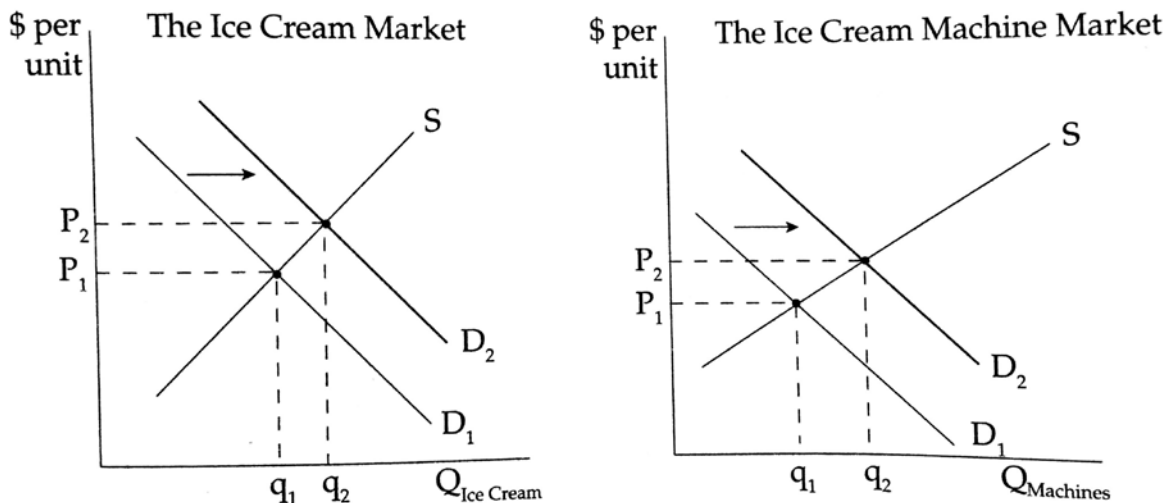
	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Firms	very many	many	few	one
Barriers	none	low	high	prohibitive
Market Power	none	some	substantial	complete
Product	homogenous	differentiated	homogenous or differentiated	unique
Long Run Economic Profit	zero	zero	positive or zero	positive or zero

- I. Maximizing profits (without price discrimination) for all market structures
 - a. Find where $MR = MC$
 - b. Go straight down to the x-axis to determine the quantity produced
 - c. Go straight up to the demand curve to determine the price
 - i. If the $D = MR$, this step is easy
 - d. If price is less than AVC , the firm will shut down
 - e. Otherwise, the firm will produce at Q and at a price of P
 - f. Profit = total revenue – total costs = $(P - ATC) \times Q$

Micro Unit 7: Factor Markets¹⁰

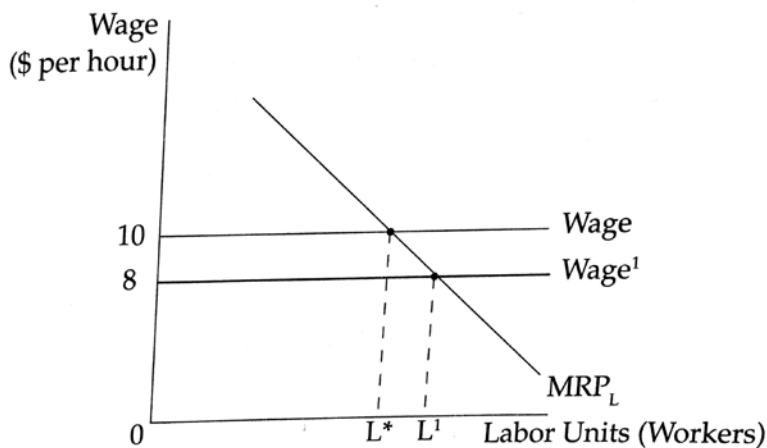
Instead of working with demand for products, we are now working with demand for the factors of production e.g. land, labor, capital.¹¹

EXAMPLE: Factor Markets – Ice Cream Machines



- I. If the demand for ice cream increase, the demand for ice cream machines will also increase

GRAPH: Marginal Revenue Product of Labor

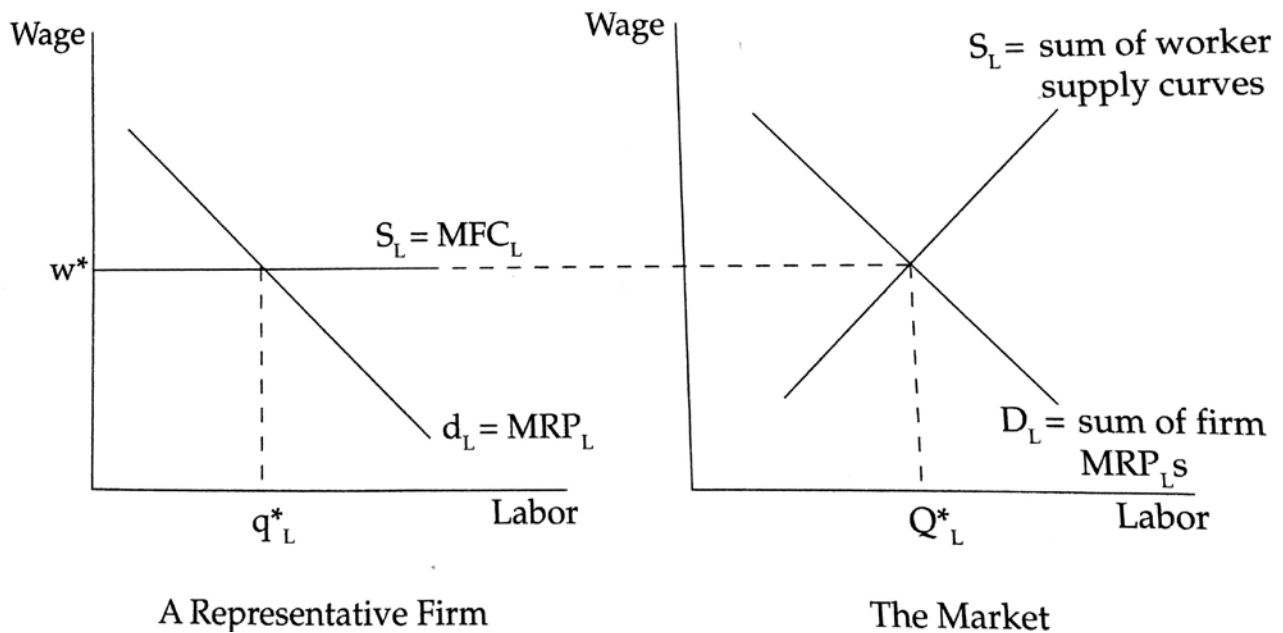


¹⁰ This is one of the hardest units in microeconomics. It is easy to confuse product markets with labor markets and vice versa, but you need an adept understanding of both to score well on the AP Test.

¹¹ Most graphs and examples will use labor in the explanation of factor markets. The determination of other factor prices is analogous to the material in this section.

- I. $MRP_L = MP_L \times P_{output}$
- II. Assuming firms can't price discriminate, those facing downward sloping demand curves must lower the price of all output in order to sell more output produced by additional units of an input
 - a. The most a firm would be willing to pay for another worker (or other factor of production) **in the short run** is that factor of production's marginal revenue product
- III. Want to hire at the intersection of wage and MRP
 - a. If less workers are hired, there is still the opportunity to hire more workers and pay them less than the value of their contribution to revenues
 - b. If more workers are hired, those excess workers are paid more than the value of their contributions to revenues
- IV. If MRP shifts outward, demand for labor will increase and vice versa
- V. Demand for labor is a **derived demand**
 - a. i.e. firms demand labor b/c consumers demand their products

GRAPH: Perfectly Competition – Labor Market



- I. Each firm is a wage taker, just as firms are price takers in a perfectly competitive output market
- II. Market demand for labor is the horizontal summation of individual firm demand curves
- III. Market demand shifters to the right (opposite will shift D_L in)
 - a. Increase in the number of firms in the market

b. Increase in the MRP_L in the individual firms

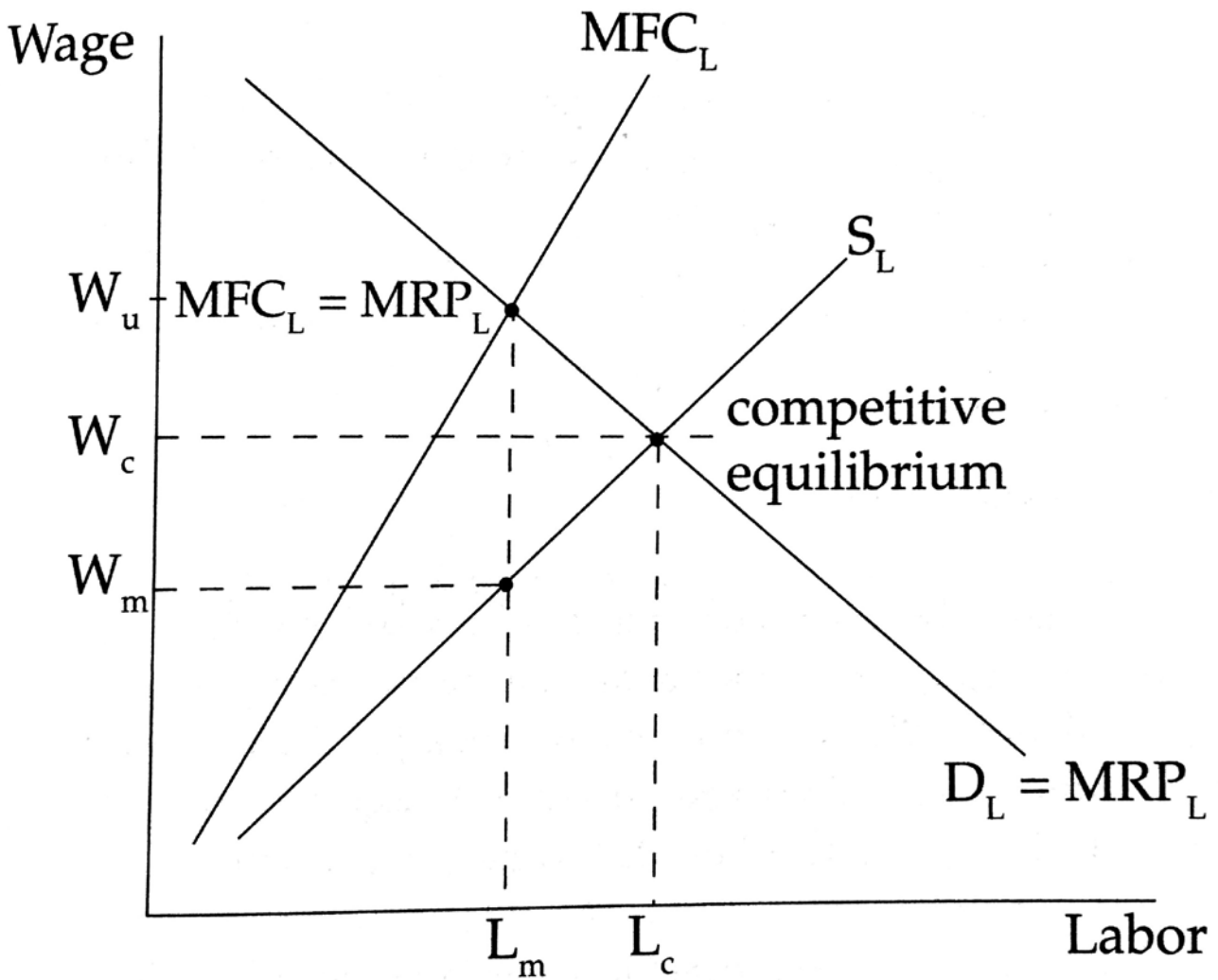
IV. Equilibrium wage

a. Intersection of S_L and D_L

b. Zero unemployment¹²

i. Everyone who would like to work has the opportunity to do so

GRAPH: Monopsony



I. E.g. mining company in a small mining town

¹² Unemployment is discussed further in macroeconomics.

- II. Key characteristics
 - a. Like a monopoly, but for factors of production
- III. **Supply curve is upward sloping**
 - a. Must raise wages of all workers to hire an additional worker
 - b. **Price \neq marginal factor cost (MFC)** at output levels greater than zero
 - i. MRC rises as Q increases
- IV. Find where $MFC = MRP = D$ to find the quantity of output
 - a. Trace your finger downwards until you hit the supply curve to find wage
- V. In contrast to a perfectly competitive labor market
 - a. Price = MFC as firms can hire all of the workers they want at the same market wage
 - b. **Firms hire more workers (L_c) and pay them more (W_c)**

Unions (less common)

- I. Workers form unions to increase their collective bargaining and lobbying strengths
- II. Goals
 - a. Increase the demand for labor
 - b. Decrease the supply of labor
 - i. Unions comprised of skilled workers do this
 - c. Negotiate higher wages
 - i. Unions comprised of unskilled workers tend to use their size to their advantage

Micro Unit 8: Market Failures and the Role of Government

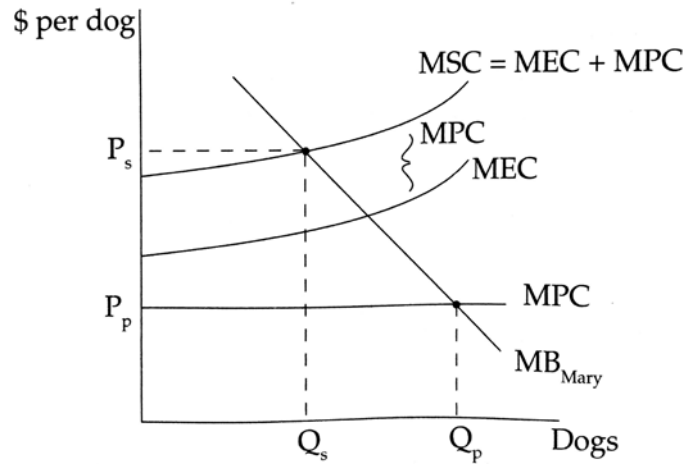
Market Failures

- I. Occurs when resources are not allocated efficiency ($P = MC$)
 - a. Imperfect competition
 - b. Externalities
 - c. Public goods
 - d. Imperfect information
 - i. Buyers and sellers don't have full knowledge about available markets, prices, products, customers, suppliers, and so forth
 - ii. E.g. consumers pay too much for a product b/c they aren't aware of a cheaper alternative

Externalities

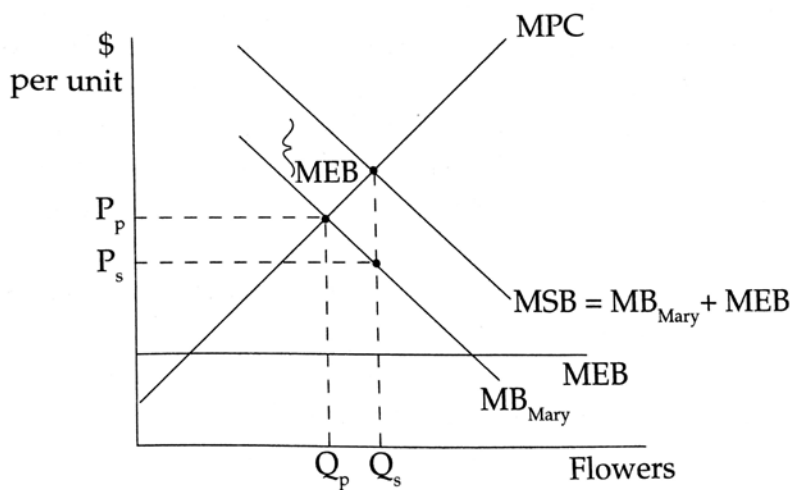
- I. Costs and benefits felt beyond those causing the effects: spillover effects
- II. Lead to inefficient allocation of resources as those making decisions fail to consider all of the repercussions of their behavior
- III. Negative externalities
 - a. Lead to overconsumption of a good
 - b. Solutions
 - i. Can be taxed by the amount of the MEC
 1. E.g. taxing cigarettes
 2. **Internalize the externality**
 - ii. Restricting output to eh socially optimal quantity
 - iii. Imposing a price floor at the socially optimal price
- IV. Positive externalities
 - a. Lead to underconsumption of a good
 - b. Solution
 - i. Can be subsidized by the amount of the MEB
 1. E.g. subsidizing higher education

EXAMPLE: Negative Externality¹³



- I. MPC = marginal private cost
 - a. Additional cost Mary pays for each additional dog
- II. MEC = marginal external cost
 - a. Additional cost imposed Mary's neighbors due to biting, barking etc.
- III. MSC = marginal social cost = $MPC + MEC$
- IV. MB = marginal benefit = Mary's demand curve for dogs
- V. Mary will own Q_p dogs if we ignore the negative externality
- VI. Mary will own Q_s dogs if we account for the negative externality

EXAMPLE: Positive Externality¹⁴



¹³ Notice the similarities to the cost curves in perfect competition. MSC is to ATC as MEC is to AVC and MPC is to AFC .

¹⁴ Marginal private benefit (MPB) is equivalent to MB .

- I. MPB = marginal benefit = Mary's demand curve for flowers
- II. MPC = marginal private cost
 - a. Additional cost Mary pays for each additional flower
- III. MEC = marginal external benefit
 - a. Additional benefit Mary provides to her neighbors for each additional flower planted
- IV. MSB = marginal social benefit = MPB + MEB
- V. Mary will own Q_p flowers if we ignore the positive externality
- VI. Mary will own Q_s flowers if we account for positive externality

Public Goods

- I. Those that many individuals benefit from at the same time
- II. Key characteristics
 - a. Nonrival in consumption
 - i. One person's consumption doesn't affect its consumption by others
 - ii. E.g. Mrs. Keats' use of the park doesn't affect Mr. T's use of the same park
 - b. Nonexcludable
 - i. Goods cannot be held back from those who desire access
 - ii. E.g. the police cannot choose who they protect
- III. Free rider problem
 - a. Consumer attempts to benefit from a public good without paying for it
 - b. Consumers know they can enjoy the provision of these goods without paying for them
 - c. Thus, the gov. oftentimes provides these goods and pays for them through taxes

Antitrust Legislation (less common)

- I. Sherman Act (1890)
 - a. Declared attempts to monopolize commerce or restrain trade among the states illegal
- II. Clayton Act (1914)
 - a. Strengthened the Sherman Act
 - b. Specified that monopolistic behavior such as price discrimination was illegal
- III. Robinson-Patman Act (1936)
 - a. Allows price discrimination in certain circumstances

- i. E.g. differences in marketability of product

IV. Celler-Kefauver Act (1950)

- a. Banned select vertical mergers
 - i. Merger of firms in the various steps in the production process
- b. Banned select horizontal mergers
 - i. Merger of firms who are direct competitors

Measures of Market Power (less common)

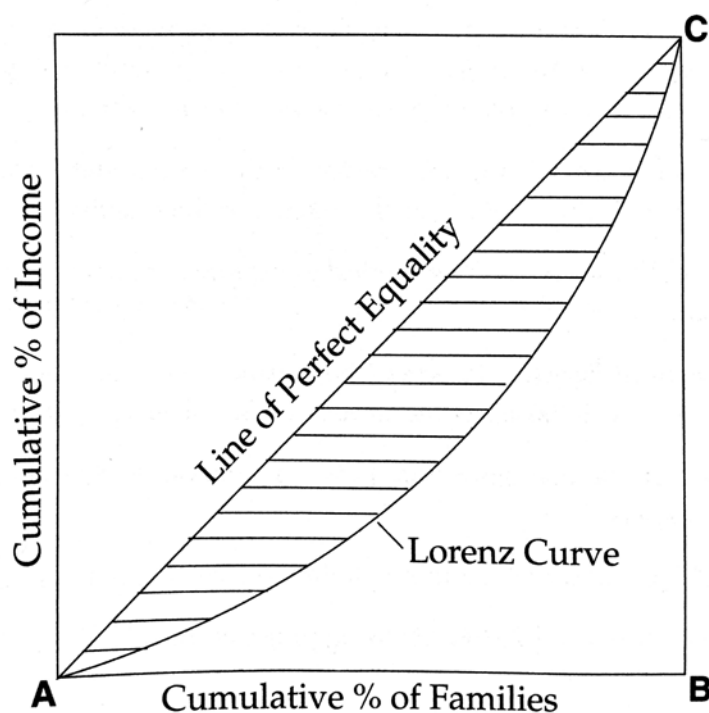
I. Herfindahl-Hirschman Index (HHI)

- a. $HHI = \sum_{i=1}^m S_i^2$
 - i. Takes the market share of each firm in an industry as a percentage, squares each percentage, and adds them up
- b. Increases as the number of firms in the industry decreases and/or as the firms become less uniform in size

II. N-firm concentration ratio

- a. Sum of the market shares of the largest n firms in an industry, where n is an integer

GRAPH: Lorenz Curve



- I. Measure of income inequality
- II. Horizontal axis starts with the poorest families on the left and ends with the richest families
- III. Gini coefficient = $\frac{\text{shaded area}}{\text{area of } \Delta ABC}$
 - a. If the Lorenz curve was the line of perfect equality, the poorest $n\%$ of people would own $n\%$ of the wealth in their nation: Gini coefficient = 0
 - b. United States Gini coefficient: 0.45

Poverty and Taxes

- I. Poverty line
 - a. Official benchmark of poverty
- II. Progressive tax
 - a. Gov. receives a larger percentage of revenue from families with larger incomes
- III. Regressive tax¹⁵
 - a. Gov. receives a larger percentage of revenue from families with smaller incomes
- IV. Proportional tax
 - a. Gov. receives the same percentage of income from all families
- V. Social Security
 - a. Provides cash benefits and health insurance to retired and disabled works and their families

¹⁵ For example, Mrs. Keats employs a regressive curve in her class: the curve helps you more the worse you do.